International Journal of Occupational Safety and Ergonomics (*JOSE*) 2013, Vol. 19, No. 2, 167–183

Safety Management in Multiemployer Worksites in the Manufacturing Industry: Opinions on Co-Operation and Problems Encountered

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Co-operation between different parties and effective safety management play an important role in ensuring safety in multiemployer worksites. This article reviews safety co-operation and factors complicating safety management in Finnish multiemployer manufacturing worksites. The paper focuses on the service providers' opinions; however, a comparison of the customers' views is also presented. The results show that safety-related co-operation between providers and customers is generally considered as successful but strongly dependent on the partner. Safety co-operation is provided through, e.g., training, orientation and risk analysis. Problems encountered include ensuring adequate communication, identifying hazards, co-ordinating work tasks and determining responsibilities. The providers and the customers encounter similar safety management problems. The results presented in this article can help companies to focus their efforts on the most problematic points of safety management and to avoid common pitfalls.

co-operation manufacturing industry multiemployer worksite outsourcing safety management shared worksite

1. INTRODUCTION

1.1. Safety Management in Multiemployer Worksites

Growing competitiveness and globalization of business markets force companies to focus on their core business [1, 2]. Therefore, outsourcing peripheral operations has become an inseparable part of companies' operations and management over the past few years. Companies in the manufacturing sector favour outsourcing operations supporting companies' core functions to service providers, e.g., installations, maintenance, property maintenance, cleaning and transport [3, 4, 5, 6].

Outsourcing is commonly seen as a profitable activity because of, e.g., possibilities to focus on core activities, reduced costs, increased flexibility and access to special skills [5, 7, 8]. However, the effects can also be negative [6, 9]. In multiemployer worksites, personnel from providers' companies work alongside customers' employees. Customer companies and service providers with providers' contractors form a complex liaison network, in which operators have varying co-operation roles [10, 11]. Hence, besides the companies' own success in their activities, they are partly dependent on the performance of other companies in the network [12, 13, 14, 15]. In a safety context, this means that in a multiemployer

The authors acknowledge the financial support of the Finnish Work Environment Fund, the Finnish Maintenance Society Promaint and the group of Finnish industrial companies for the research project "Safety Management of Industrial Services". Special thanks go to the representatives of the Finnish manufacturing industry who contributed to the study by participating in interviews and responding to the questionnaire. The authors wish to sincerely thank Professor Jouni Kivistö-Rahnasto, Noora Hintikka, D.Sc. (Tech.), and Marileena Koskela, M.Sc. (Eng., Econ.) for their valuable comments during the writing process.

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worksite, the performance of one employee may affect negatively the safety of other employees regardless of their employer [16]. Hence, all companies sharing a worksite to a certain extent depend on each other's success in managing safety [17].

If companies in the supply chain do not adapt safety practices, negative consequences may arise, e.g., serious or even fatal injuries, higher insurance costs, financial and legal consequences, and difficulties in reaching customers and employees [18]. Therefore, to ensure adequate safety levels, both customer and provider must co-operate to implement the required safety measures [19, 20, 21]. Accordingly, European safety regulations include a statement that all employees sharing a worksite have to ensure, by themselves and in co-operation, that their performance does not endanger safety and health in a worksite [22]. Safety management and co-operation regarding safety in a multiemployer worksite may be carried out, e.g., by organizing orientation programmes on hazards at a worksite, reviewing all safety rules and investigating accidents together with all participants sharing a worksite [23, 24, 25].

1.2. Problems in Safety Management in Multiemployer Worksites

New employees and changes in an operating environment that come with outsourcing, introduce new kinds of challenges in safety management. In multiemployer worksites, e.g., organizing, co-ordinating and timing work tasks are more demanding than in traditional one-employer worksites. Moreover, complex relations between customers and providers may create confusion in work performance [6]. Several safety problems associated with outsourcing and safety management in multiemployer worksites have been reported. Many of these issues are even more problematic to manage for service providers than for customers because providers operate with several customers in various and sometimes unfamiliar worksites and even on short notice. Providers' safety management is complicated even further because all customers and worksites have their own working practices and cultures to which providers have to adapt their own performance [26]. The problems of safety management in multiemployer worksites are related, e.g., to the poor selection of providers, lack of resources, ambiguity in responsibilities, weak commitment, complexities in management and supervision, dangerous work tasks and practices, insufficiencies in communication, differences in working cultures and insufficient hazard identification [6, 9, 27, 28]. In addition, external employees' poor knowledge of work tasks and worksites [20], insufficiencies in safety training [29] and long supply chains [20] are considered to contribute to safety-related problems. Sections 1.2.1.–1.2.12. discuss these factors.

1.2.1. Provider selection

Providers have a remarkable effect on worksite safety [30]. Even so, systematic assessment criteria of safety level are rarely used when selecting industrial providers [31]. The price of services is another important issue when selecting providers, at least in the process industry [32]. This gives providers the impression that safety is an extra cost that customers are not willing to pay. Thus, e.g., in construction, it is common practice for providers to cut out safety costs in tenders, which may, in the worst scenario, even endanger employees' safety [33].

1.2.2. Resources

Studies in the construction industry showed that in small companies the resources available for safety management were limited and, as a result, some providers were unable to ensure a proper level of safety performance [27, 34]. This problem, identified also in the process industry, may even be emphasized if providers contract out tasks further, commonly to smaller companies, which have even fewer resources to allocate [5].

1.2.3. Responsibilities

Responsibility distribution in multiemployer worksites creates confusion for both customers and providers. Thus, many customers expect providers to manage the safety of outsourced tasks

by themselves but providers think that customers should contribute to the assurance of safety [35]. Responsibilities may be out of focus, e.g., if they are only briefly discussed in agreements [5], not allocated in sufficient detail [17] or segmented to several operators [36].

1.2.4. Commitment

Research on outsourcing in the construction business showed that providers were not always committed to managing safety issues in a worksite because of their minor involvement in decisions that affected safety [27]. Insufficient commitment to improving safety performance is more common with small construction companies, which usually place less priority on safety than larger companies [29, 34].

1.2.5. Management and supervision

In multiemployer worksites, safety problems may arise because employees work under the supervision of several managers responsible for different sectors [37]. It is also possible that no supervisors have been assigned [37] or they are not present at a worksite [38].

1.2.6. Dangerous work tasks

As a result of customers' willingness to outsource tasks that are considered dangerous, a great proportion of outsourced work tasks, e.g., in the chemical industry, involve more risks and may even be performed in poorer conditions than those performed by the employees of customer company [39]. High-risk tasks increase accident proneness [39, 40].

1.2.7. Dangerous working practices

Industrial providers are more prone to dangerous and even illegal working practices than customers [9]. Unfamiliar work tasks and worksites, along with unawareness of the hazards they involve, may increase the temptation to take shortcuts and use dangerous working practices [5]. In addition, the pressure of tight time frames can cause providers to work in a hurry and even to violate safety instructions [6, 17].

1.2.8. Communication

In shared worksites, breaks in the information flow commonly occur, e.g., because performers sometimes overlook sharing information with their partners [37]. If information does not reach all employees, the general view and the importance of an individual's safety performance may remain unclear [41].

1.2.9. Attitudes and culture

Employees in multiemployer worksites can come from different working cultures [42]. Providers may work with several customer companies who have their own organizational and safety cultures as well as different working habits and practices [26]. Problems may arise if attitudes towards outsourcing are poor or employees' attitudes are defective, e.g., employees are ignorant of safety regulations and instructions [32].

1.2.10. Hazard identification

According to Mynttinen's study on food industry companies, most customer companies identify hazards for tasks performed by their employees, but they rarely discuss theme with providers [31]. Trethewy, Atkinson and Falls found that providers in the construction business assessed their tasks more rarely because most of them did not have adequate resources, competence or willingness to control hazards systematically [28]. Another factor hindering proper hazard identification, identified in the chemical industry, is that companies do not have reliable and comprehensive data on the accidents and injuries in worksites because customers rarely compile statistics on accidents involving their providers [40].

1.2.11. Knowledge, competence and training

Studies of high-risk environments showed problems with providers' competence and training. Employees of providers' companies do not have knowledge and experience of work tasks or a worksite equivalent to the company's own employees [20]. Moreover, providers' employees are often younger and have had less safety training than employees of customer company [43].

They have inadequate understanding of a worksite, operational safety requirements [20] and customer companies' practices and procedures [36]. In the construction industry, many customers do not provide prework safety training to providers' employees but leave it as an on-the-job learning exercise [29].

1.2.12. Supply chains

A long supply chain with several different operators builds a complex network of collaborating companies, which can confuse safety responsibilities and performance [44]. Further outsourcing may also cause replacing originally selected committed and competent providers with providers who regard safety as a secondary concern [5].

1.3. Research Problem

Research on safety-related problems and risks in multiemployer worksites has certain limitations. For example, most studies in this area focus on the construction industry [27, 28, 34] or some specific branches of the manufacturing industry like the chemical industry (e.g., Beale [5]; Blank, Andersson, Lindén, et al. [39]; Kochan, Smith, Wells, et al. [40]). Furthermore, many studies discuss the risks of multiemployer worksites only from a specific point of view (e.g., safety training or accident investigation) [45, 46]. Moreover, most studies approach the subject from a customer's viewpoint [20, 32, 36, 43, 47]. Even though providers face challenging or even more significant risks, there has not been much research in this area to date [48]. Few studies describe problems confronted by providers and none compare these with problems perceived by customers. Even though safety legislation includes multiemployer worksites and providers' obligations [22], guidelines for provider companies, particularly smaller ones, on implementing efficient safety management in practice are not easily available [49].

Scientific publications describe networks and co-operation between networked partners. However, safety co-operation in multiemployer worksites built up by customer companies and their providers has been studied significantly less. Most publications on safety-related co-operation bypass this problem and discuss only the importance or forms of safety co-operation [19, 20, 21, 23]. The success of co-operation aimed at improving safety in shared worksites, the factors influencing it and its variety have received minor attention in scientific literature to date.

Thus, there have been some studies of safety problems encountered and safety co-operation implemented in multiemployer manufacturing worksites. However, better understanding of the actual situation is important for both academics studying the subject and for those performing practical safety work. This information is essential to ensure that managers and other employees can focus their efforts on the most problematic points of safety management and avoid common pitfalls when implementing safety management and co-operation in worksites. To obtain further information on the level of co-operation and safety problems faced in multiemployer worksites, especially by providers, more comprehensive research is necessary.

1.4. Aims of the Study

This article discusses safety management in multiemployer manufacturing worksites shared by customer companies and service providers. The main viewpoint in the discussion is the perception of the providers. The aims of this paper are (a) to review opinions on safety co-operation between the service providers and the customers, (b) to point out factors complicating safety management in multiemployer manufacturing worksites, (c) to identify whether the service providers' opinions differ from those of the customers.

In this study, manufacturing operations were operations performed by or for a company from the manufacturing industry. The customer companies represented the manufacturing industry, but the providers were from different business sectors.

2. MATERIAL AND METHODS

2.1. Materials

The material for this study was gathered with company interviews and questionnaires. The aim of the interviews was to identify safety-related

practices and safety management both in companies providing manufacturing services and in their customer companies. Moreover, a further aim was to determine the level of safety-related co-operation between the service providers and the customers in multiemployer manufacturing worksites. The aim of the questionnaire was to complement the results of the interviews and to gain comprehensive information on the opinions of the industrial service providers. Another objective was to compare the opinions of the service providers with those of the customers. Sections 2.1.1.–2.1.2. discuss the content of the interviews and the questionnaire and their implementation.

2.1.1. Interviews

Researchers conducted the interviews discussed in this article in the companies. Representatives of the service provider companies and three customer companies were interviewed for a second time because their answers needed to be specified. The interviews were not tape-recorded but two interviewers took notes; one researcher was the main interviewer, the other asked complementary questions. Most of the interviews were group interviews where the number of interviewees varied from 2 to 5. The occupational position of the individual interviewees varied; one of them, delegated by the company, was always a contact person. The interviews of the representatives of the service providers were conducted separately from the customers'. However, most interviews of the representatives of the customer companies were conducted together with the representatives of the service providers. All group interviews were also supported with so-called collective remembering, where the interviewees could complement each other's memory.

The interviewees were from 13 Finnish companies, which were service providers or customer companies. The customer companies were also the actual customers of the interviewed service providers. Five companies operated as pure industrial service providers and five as pure customer companies. Two companies operated both as the service providers and the customers. They were interviewed from both viewpoints at the same time. However, the viewpoints were separated in the analysis of the results. Moreover, one industrial service provider considered its operations with an internal customer. This company was interviewed and analysed separately regarding the two viewpoints. The total number of interviewees was 39. The companies covered different branches of industry, e.g., forestry, packaging, food and energy. The individual interviewees worked as managers (e.g., safety, security, maintenance and human resources), superiors and employees. Some employees were safety representatives alongside other activities.

Two separate lists of open-ended questions, based on the literature review and previous research, were compiled for the purpose of the interviews. One was for the representatives of the industrial service providers, the other for the representatives of the customers. The interviews were semistructured, i.e., the interview focused on particular subjects but the structure and order of the questions varied. Discussions with the service providers covered the following subjects: the company's operations, provided services, safety of the provided services, actual accidents and incidents that occurred when performing these services. The subjects discussed with the customers were purchasing services and their safety. The lists of questions were partly merged for joined interviews of the representatives of the industrial service provider companies and the customer companies.

2.1.2. Questionnaire

A questionnaire on the opinions of safety management in multiemployer worksites was based on the results of the interviews and the literature review [50]. The questionnaire was directed at members of the Finnish Maintenance Society Promaint. The aim of this society is to enhance the competitiveness of Finnish industry and increase knowledge about the importance of maintenance as part of a company's competitive strength. Members of the society are individual, company and co-operative members operating in the maintenance business or promoting the purpose of the society via their operations [51].

The questionnaire was a web survey; 347 members of the Promaint received an e-mail inviting

them to answer the questions. The respondents in the target group were individual and companies' members operating within safety, maintenance or plant maintenance. The individual respondents worked as managers, superiors or engineers. Within a 10-day answering period, 57 responses were received. A reminder was sent to increase the number. As a result, there were 32 additional responses, yielding a total of 89 responses (response rate: 25.6%). Fourteen questionnaires were discarded from further analysis because they were not from main industrial operators: six represented occupational safety authorities or organizations providing education in occupational safety, one did not provide services to industry, five were manufacturing organizations of which three did not provide services at all and two only as a secondary activity, two questionnaires were discarded because the respondents had not reported whether they represented the service providers or the customers. Therefore, the total number of 75 respondents from companies operating in or for the manufacturing industry were included in further analysis. These respondents were from the manufacturing sector, e.g., food, paper, wood, metal and chemical industries. Forty-three respondents (57%) represented companies operating mainly as the service providers and 32 respondents (43%) represented companies operating mainly as the customers.

There were questions on the success of safety-related co-operation (closed questions, five options ranging from *very successful* to *very weak*); on the success of co-operation with a partner (closed questions with answers: *successful co-operation with all partners*, *co-operation success depends on the partner* and *unsuccessful co-operation because of the partners*); on the factors affecting the success of safety co-operation (open questions) and on the most significant problems of safety management faced when working in shared worksites (closed questions, see Table 2 for answers). Furthermore, there were questions on respondents' backgrounds such as the respondents' positions in the organization and their responsibilities in safety issues, the number of personnel at the respondents' organizations and their partner companies' branches. Approved certificates, or those waiting to be approved, were also listed. In addition to the subjects this article discusses, implemented safety measures, safety issues in contracts and operating abroad were also reviewed.

2.2. Analysis of Material

The answers given during the interviews were examined, classified into subjects and counted. First, the answers were divided into subject groups such as training, flow of information, responsibilities and risk analysis. Subsequently, the group of answers were tabulated and then the frequency of certain answers for both the service providers and the customers were counted. However, the frequencies section 3 presents are only indicative because not all subjects were talked through during the interviews, just those important for the interviewees.

The questionnaire data were analysed with SPSS 16.0 and basic features of the data were summarized with descriptive statistics. The dependencies between variables were identified with Fisher's exact test, the Mann–Whitney *U* test and the Kruskal–Wallis test.

3. RESULTS

3.1. Interviews

3.1.1. Interviewed companies

The service providers performed maintenance and repair services as well as installations, mechanical engineering, cleaning and industrial sanitations, property maintenance, guarding and reception, professional and life cycle services, and packing services. The operations involved both preplanned and acute work. The customer companies purchased mainly maintenance, repair and installation services but also property maintenance and cleaning, industrial sanitation, guarding and reception, machinery engineering, environmental services and occupational health care services.

Most service providers and customers had hundreds of employees. Three service providers

employed thousands of employees and one employed under 50 employees.

Some service providers and two customers confirmed that they certified their operations. The certificates were Standards No. ISO 9001:1997 [52], ISO 14001:2004 [53] and OHSAS 18001:2007 [54]. One customer company reported that it used Standard No. PSK 7901:2001 [55], based on international and European framework standards, to harmonize its service contracts with the providers.

3.1.2. Safety-related co-operation between providers and customers

The described level of co-operation between the providers and the customers varied. Co-operation could be divided into the following categories: education, orientation and guidance; flow of information; risk analysis, auditing and accident investigation.

Training, orientation and guidance

Interviewees frequently mentioned safety-related training. For example, over half of the service providers said that customers provided beforehand safety training to the service providers' representatives. In proportion, a similar number of the customers mentioned that they arranged training for other parties. Training was directed at either all the staff working at a worksite or only supervisors. Moreover, the customer provided introductions and occupational guidance. A few customers emphasized that they gave strict instructions, especially for the yearly maintenance process.

Flow of information

The flow of information seemed to be better during contract negotiations than at the time of actual operations. Most service providers mentioned that safety issues had already been considered before negotiating a contract. Half of the customers had a similar opinion. Over half of the service providers mentioned having joint meetings with customers' representatives on occupational safety. Half of the customers mentioned having a similar situation with safety providers' representatives. These meetings were arranged particularly during yearly maintenance. One provider also pointed out that they were able to participate in the customers' work safety committee.

A few providers stated that they were informed about customers' accidents and near misses. Two customers mentioned receiving similar information from a provider. However, only one provider mentioned that their customers required information on accidents occurring to providers' employees. One customer stated that some providers required information on accidents occurring to customers' employees.

Risk analysis, auditing and accident investigations

A few service providers mentioned co-operating with customers on risk analysis and accident investigation. Half of the service providers said they analysed the risks at customers' worksites. One provider offered risk analysis services to customers. Two providers were able to analyse the risks at worksites with customer. Only one provider mentioned that customers, especially larger ones, also audited the safety of their operations. One provider said that they investigated their own accidents at customers' facilities with customers. Two customers mentioned having a similar policy with providers.

The interviewed service providers, as well as the customers, described different forms of safety-related co-operation with their partners. A common statement was that shifting from subcontracting towards partnership (e.g., the provider is responsible for the whole maintenance and repair process instead of a single task) also added safety-related co-operation.

3.1.3. Problems in safety management

The interviewees mentioned several problems related to safety co-operation. These safety-related problems can be divided into five categories: flow of information, responsibility issues, relationship with subcontractor, working in other organizations and working abroad.

Flow of information

The flow of information was commonly considered inadequate. A few providers and over half of the customers perceived that the flow of information between parties was inadequate. Problems could arise from, e.g., the fact that the information from employers' or customers' representatives was not transferred to the person performing the work, the person performing the work and the supervisor were not in the same place, staff member did not know whom to inform in different situations.

Responsibility issues

Responsibility issues were considered as difficult both between the two parties and in general. A few providers mentioned that responsibilities were unclear. The issues included arranging training, orientation and guidance, purchase of safety equipment, investigation and information of accidents and incidents, and insurance requirements. Moreover, couple providers considered the responsibility issues between contracting parties as unclear. A few customers had a similar opinion. The interviewees noticed that responsibility issues were not often solved until they reached courts of justice.

Working in other organizations

Having various worksites creates different challenges for service providers. Some service providers mentioned this as a challenge. Attitudes to safety are different in different worksites and organizations. Moreover, different worksites also require various licences and competencies. It is also difficult to plan assignments ahead when worksites constantly change. A few service providers mentioned ongoing haste as a challenge. However, if a service provider interferes with the way a customer is managing safety issues, they might lose the contract.

Relationships with subcontractors

The customers mentioned different challenges related to relationships with subcontractors. A few customers mentioned providers' staff turnover as a problem. One customer said that subcontractors' turnover was a problem. Co-operation with a new service provider also created a great deal of groundwork for the customer. Finding a good subcontractor was mentioned as a problem.

Working abroad

Finnish companies considered operating abroad as a challenge. A few service providers also felt that the greatest challenges came from operating abroad. These challenges included different safety culture, inadequate orientation and guidance, responsibility issues, various licenses, different legislation and different contract terms. However, the major problems were outside a worksite, e.g., prevalent culture, language and traffic. A few service providers said that finding help when faced with problems abroad was difficult. Moreover, national authorities were not willing to commit themselves on issues abroad. Finally, similar challenges related to a different culture and language could affect foreign employees working for a Finnish company.

3.2. Questionnaire

3.2.1. Respondent companies

The service providers performed maintenance and repair services as well as installations, cleaning and industrial sanitations, property maintenance, professional and life cycle services, engineering and insulation services. The customer companies purchased mainly maintenance, repair and installation services but also property maintenance and cleaning, guarding, transport, construction, engineering, environmental services and occupational health care services.

Only 16% of the provider organizations were pure providers who did not purchase any services from other companies. Of the customer companies, 72% were pure customers not providing any services to other companies.

Two thirds of the service providers employed at least 50 employees, 23% of the service providers were medium-sized companies with 10–49 employees and 9% of the providers were small companies with under 10 employees. The difference in the size of the service providers

was not statistically significant compared to the customer companies. About 80% of the service providers had already certified or would soon certify their operations. The most common certificates were Standards No. ISO 9001:2007 [52] (70% of the respondent companies), ISO 14001:2004 [53] and OHSAS 18001:2007 [54]. Almost 60% of the providers had or intended to have Standard No. ISO 14001:2004 [53] and fewer than 40% Standard No. OHSAS 18001:2007 [54]. There were no statistically significant differences in the proportions when comparing to the customer companies.

The respondents from the provider companies represented middle management (61% of the respondents) and top management (30% of respondents). A few respondents were from line management and general employees (in total, 9%). The distribution of the respondents' status did not differ significantly between the providers and the customers. Only every fourth provider respondent reported occupational safety responsibilities. There were statistically significant differences between the provider and the customer companies for the respondents from the customer companies who had twofold more safety-related responsibilities than the providers' representatives ($p = .008$).

3.2.2. Safety-related co-operation between providers and customers

Most service providers considered safety-related co-operation with customers as successful. Almost 75% reported co-operation as successful to some degree but only 5% said it was very successful. No providers reported co-operation to be very weak, but every ninth considered it somewhat weak. There were statistically significant differences in opinions between the providers and the customers ($p = .062$). No respondents representing customer companies assessed co-operation as weak but every third company reported co-operation to be neither weak nor successful. Two thirds of the customers considered co-operation to be somewhat successful. However, even though co-operation was mainly considered as successful, it was also perceived to be strongly partner-related. Over 80% of the service providers reported that the success of co-operation depended on its partner. Thus, every seventh company assessed co-operation as successful and only one described it as weak with all their partners. The customers and the providers had similar opinions and there were no statistically significant differences between these groups. No background factors (organization size, respondent's status, safety responsibilities or certificates) had a statistically significant effect on the service providers' assessment of the co-operation success.

The service providers, who answered a question on factors affecting the success of co-operation between a service provider and its customers, considered attitudes and safety culture the most significant factors in achieving successful co-operation. Other factors included familiarity with the partner, commitment to safety, shared rules and safety level. Table 1 presents the percentages of most commonly reported contributing factors. The providers' backgrounds had a statistically significant influence on the responses in the case of a common goal ($p = .040$). None of the providers representing companies who had already certified, or were in the process of certifying, their operations considered a common goal to be a significant factor influencing the success of the co-operation, in contrast to 33% of the respondents from noncertified companies. The only statistically significant difference between the providers and the customers was in the case of instructions ($p = .039$). The service providers did not consider that instruction-related issues affected the success of co-operation. However, 17% of the customers mentioned compliance with instructions, familiarity with safety instructions, drawing up written instructions and consolidation of different performers' instructions as significant contributors.

3.2.3. Problems in safety management

The service providers reported ensuring adequate flow of information to be the most common problem in safety management in multiemployer worksites. Almost 50% of the providers considered this factor as a challenge. Almost 50% of the service providers also mentioned hazard identification and risk assessment as well as co-ordination of different

performers' operations to be significant challenges. Table 2 shows detailed information on the percentages of factors considered to be problematic. The opinions on problematic factors were not dependent on different background factors. However, opinions related to the organization of supervision differed significantly between the service providers and the customers (p = .023). The customers considered this factor difficult to manage three times more often than the providers.

TABLE 1. Factors Affecting the Successful Safety-Related Co-Operation

Factor	Providers (%) (n = 28)	Customers (%) (n = 24)
Attitudes and safety culture	36	29
Familiarity of a partner and procedures	18	17
Commitment to safety	14	17
Shared rules	14	4
Safety level	14	0
Training and orientation	7	17
Common goal	7	13
Company size	7	0
Economy and safety	7	0
Information flow and transparency	4	17
Resources	4	8
Instructions	0*	17*

Notes. * = statistically significant differences between the provider's and the customer's perception at a 5% risk level.

TABLE 2. Opinions on Safety-Related Problems in Multiemployer Worksites

Safety-Related Problem	Providers (%) (n = 43)	Customers (%) (n = 32)
Ensuring adequate flow of information	56	56
Hazard identification and risk assessment	47	56
Co-ordination of different performers' operations	47	44
Co-ordination of simultaneous work tasks	40	44
Differences in performers' working habits	37	53
Task planning	37	25
Occupational instruction and guidance	26	34
Determination of responsibilities	23	28
Pointing out other performers' dangerous actions	23	13
Unclear objectives	14	22
Co-operation in investigation of near misses	14	16
Turnover of worksites	14	6
Organization of supervision	12*	34*
Availability of working instructions	12	12
Possibility to intervene in defects	12	6
Multiplicity of worksites	9	9
Co-operation in accident investigation	7	9

Notes. * = statistically significant differences between the provider's and the customer's perception at a 5% risk level.

4. DISCUSSION

4.1. Evaluation of Material

This study was conducted through a questionnaire and interviews with representatives in the Finnish manufacturing industry. Thirty-nine people participated in the interviews and 75 in the questionnaire. Therefore, the amount of data can be considered as moderate. However, the interviewees and the respondents represented a wide range of manufacturing companies in Finland, e.g., with respect to the branch of business, company size and purchased or produced services. Moreover, the quality of data can be evaluated as good, as interviewees openly discussed their company safety performance and most respondents completed the questionnaire thoroughly. Even though the interviews were not tape-recorded, the most important issues were captured with twofold notes. Moreover, the second interviews enabled verification and supplementation of the results obtained during the first interviews. Further, group interviews covered representatives of different personnel groups. This approach enabled wide-ranging and multiperspective discussion. However, even though the interviews were informal and the interviewees seemed to be able to share their opinions freely, the presence of other interviewees may have hindered taking up some issues. The providers were interviewed separately from the customers to enable more honest discussion and provide more reliable information. Due to the interviewees' requests, many customer interviews also involved representatives from the providers' companies. Nonetheless, open discussion regardless of the presence of their partners can be considered easier for the customers than the providers' company.

Despite the quality of the data, the small size imposes limitations on interpretation of dependencies. For example, fairly large differences between the providers and the customers arose in the proportion of the respondents sharing certain perceptions. However, these differences were not statistically significant. Therefore, it might be worth conducting a similar questionnaire with a greater number of participants to ascertain whether additional differences in opinions exist that did not emerge in this study.

4.2. Review of Results

The next two sections review the results of this study. Section 4.2.1. discusses the results on the first study objective (safety-related co-operation between the service providers and the customers). It also reviews the relevant results on the third study objective (comparison of the providers' and the customers' views). Section 4.2.2. reviews the results on factors complicating safety management (the second study objective) and relevant parts of the third objective.

4.2.1. Safety-related co-operation

Co-operation success

Most respondents of this study described safety-related co-operation with their partners as successful. However, several respondents perceived that the co-operation was not efficient enough and believed that success was strongly partner dependent. According to some studies, efficient safety management requires co-operation between providers and customers [19, 20]. Moreover, co-operation was presented as a key factor in lower incident rates [21]. Therefore, in future research, it would be interesting to review to what degree the success of safety co-operation affects the safety level or the number of accidents in multiemployer worksites.

Co-operation modes

The interviewees mentioned safety co-operation with their partners relating to education and guidance, communication and risk assessment. It is noteworthy that even though these areas had the most frequent co-operation, only a fraction of the companies mentioned managing these factors together with their partners. For example, only two companies reported identifying hazards or assessing risks with their partners, although co-operation in these areas is said to facilitate safety performance and promote the safety of employees [31]. Moreover, parties sharing a worksite typically did not have common practices for

ensuring sufficient communication. However, legislation demands from both customer and provider highlighting the practical need for co-operation in the area of communication [16]. On the basis of these results, safety co-operation requires serious strengthening to promote the safety of all employees sharing worksites.

Factors affecting success of co-operation

Attitudes towards safety, safety culture, commitment to ensuring safety, familiarity and shared rules of the partners were reported most commonly as factors affecting the success of safety co-operation. These factors are also frequently mentioned in the literature as being essential for the efficient management of safety in a worksite [23, 24, 25, 31]. However, ensuring that these factors are sufficient is often complex for service providers who operate with several customers in various worksites, occasionally at short notice [26] and sometimes with short contracts, e.g., during yearly maintenance. Long-term partnerships have been proposed as a solution for these problems. With steady relationships between partners, common standards could be established as well as efficient interfaces, well-trained and stable workforces, and lower accident rates [56].

Differences between providers' and customers' views

An interesting point about the factors affecting the success of co-operation was that no customer perceived the companies' safety level to influence managing safety in shared worksites. However, the providers considered this the fifth most significant factor. This could be so, because even though safety in providers' companies is at a high level, a poor safety level in the customers' companies may endanger the safety of providers' employees [31]. Moreover, service providers often perceive that they have limited opportunities to comment on insufficiencies in customers' safety performance because of the possibility of losing a contract or that customers do not take their comments as seriously as those of their own employees [57]. For customers, on the contrary, making safety demands from their providers is easier and, therefore, the safety level in a worksite may not be such a high priority.

4.2.2. Factors complicating safety management

Perceived problems

The respondents of this study mentioned several points, e.g., ensuring adequate communication, identifying hazards, determining responsibilities, varying partners, co-ordinating and planning of work tasks, as being problematic factors in safety management in multiemployer worksites. The problems they reported corresponded to those typically reported in the literature, but they also mentioned previously unreported problems. Notably, the interviewees often mentioned that they co-operated in areas that were also considered problematic. This may even concern the same interviewees. Providers' representatives can have, e.g., regular joint meetings with the customers' representatives, where occupational safety is discussed, but still consider the flow of information to be inadequate. Therefore, it would be useful to study in more detail whether co-operating makes implementing of safety-related measures easier or if safety performance is perceived as difficult irrespective of co-operation.

Differences between providers' and customers' views

Differences in work cultures and operational environments of the providers and the customers clearly emerged in the context of problematic factors. The providers typically consider the planning of work tasks, changing worksites and pointing out other employees' dangerous actions as more complex than the customers. These factors show that providers operate in multiple and even unfamiliar worksites, sometimes at short notice and often on short-term contracts. On the other hand, the customers more often mentioned differences in working habits, execution of instructions and guidance, and organization of supervision as being difficult to manage. Furthermore, most customers operate with several providers who have their own ways of working and work cultures and whose employees need guidance on worksite

operations. Often, providers' employees do not have their own supervisor at a worksite and, therefore, supervision practices and responsibilities need special arrangements.

4.3. Exploitation of the Results

This study shows that even though different parties operating in multiemployer worksites in the manufacturing industry co-operate with regards to safety management, the co-operation is not in many cases wide-ranging or always successful. Moreover, a great number of both the providers and the customers encounter problems in ensuring their employees' safety. Solutions presented for the implementation of safety have to some extent taken these problems into account, but mainly from customer companies' viewpoint. Safety management guidelines directed at providers and suitable particularly for small provider companies are not available. However, solving these difficulties is essential also for providers because most of the problems are factors that can cause accidents [38, 58]. Hence, the results of this study can be used especially by provider companies but also by customers operating in multiemployer worksites when deciding to which areas safety performance and co-operation should be allocated. The results can be exploited, e.g., in planning co-operation and in distributing responsibilities when negotiating contracts and channelling safety measures and co-operation for operations at multiemployer worksites. Moreover, the results of this study offer novel viewpoints of the subject also for the academic community.

The results presented in this paper have been gathered as part of a research project entitled "Safety Management of Industrial Services", which was conducted at the Department of Industrial Management, Tampere University of Technology. The result of the project was an operational model of safety management for service providers operating in the manufacturing industry [59]. The model provides practical information for industrial providers and safety management tools for enhancing safety as part of everyday operations in co-operation with customer companies.

5. CONCLUSIONS

This article describes safety management in multiemployer worksites shared by customers and service providers. The study aimed to review safety-related co-operation and problematic factors in implementing safety management. The objective was to chart the providers' opinions on the studied subjects and compare them with those of the customers. The study focused on operations performed by or for a company operating in the manufacturing industry.

The study was conducted through interviews and the questionnaire used to review the opinions of representatives from different branches of Finnish manufacturing industry, e.g., forestry, paper, chemical, packaging, food and energy. The companies were mainly large, but the respondents of the questionnaires were also from smaller companies. The participants of the study worked as managers, superiors and employees.

The study identified that companies typically co-operated with their partners in safety management in training, orientation and guidance, flow of information, risk analysis, auditions and accident investigation. The implemented co-operation was mainly considered as successful but strongly partner-related. In particular, factors promoting the success of safety management are, e.g., positive attitudes towards safety and safety culture, familiarity with partners and their practices, commitment to safety in partner companies, rules shared by different parties and high safety levels in the co-operating companies.

The results of the study showed that ensuring an adequate flow of information, determining responsibilities, identifying hazards, co-ordinating and planning work tasks, and organizing occupational instruction and guidance need to be managed properly to avoid problems in safety management in multiemployer worksites. Moreover, the special problems caused by varying relationships with different partners, working in other companies and working abroad have to be solved to enable efficient management of safety.

The study highlights that providers and customers face similar problems when managing safety in multiemployer worksites. Therefore, parties

sharing a worksite should promote co-operation with implementation of safety activities and in this way avoid overlapping safety operations, efficiently allocate often remote resources for safety, strengthen commitment of all parties and ensure efficiency in safety.

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