Impact of International Standard System Application: In the context of ship recycling industry of Bangladesh

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ABSTRACT
Bangladesh is a developing country in which ship recycling industry plays an important role to make the economy strong. The opportunities for skill development are few with less-availability of safety measure create a great challenge through enhancing uncertainties and risks. As a result, many workers are being affected to serious diseases/injuries and have been killed in accidents. Environment is also seriously been polluted by this industry. Recently, govt. has taken some major steps to allay the problem. One of the major steps is international standardization of the industry. The study tried to explore how the working class is reacting to the new rules and actually what type of improvement happened in the ship breaking yards. To evaluate this, I have used some statistical analysis like, Data representation, cross tabulation, chi-square test, logistic regression model. The results show that most of the workers are now aware about risk and pollution caused by this sector and they are trying to adopt the rules and regulations formed for them. Yet, majority of the workers are not apprised of the rules of ship recycling industry. So, training for the workers should organize regularly both internally and externally.

Introduction
The ship recycling industry has started its journey in 1960s when a Ship named “MD Alpine” trapped on the shore Chittagong due to severe cyclone. The Chittagong Steel House brought the vessel and demolished for making scrap (Overview of Ship Breaking in Bangladesh). In the time of liberation war of Bangladesh, a Pakistani ship was damaged by bombing and later it was brought to Fauzdarhat seashore. Karnafuly Metal Works Ltd bought it as scrap, in 1974, introducing money-making ship breaking industry in Bangladesh (Young Power in Social Action). The industry developed during the 1980s becoming a large and profitable industry for Bangladesh (Md.M, H., and M. Islam. 2006). The industry grew steadily and, by the middle of 1990s, Bangladesh positioned number two in the world by tonnage scrapped (Ahmed, M. 2013). In 2008, there were 26 ship breaking yards which escalated to 40 in 2009. From 2004 to 2008, the area of this industry was the largest ship breaking yard in the world (Wikipedia www.en.wikipedia.org/wiki/Chittagong_Ship_Breaking_Yard). Since 2009, Bangladesh ranked second position after Pakistan.

From then, ship recycling industry has become a lucrative business, with few risks, for the yard owners, investors and money lenders. The industry is estimated to an annual turn-over of around USD 1.5 billion. Globally, around 700 vessels are scrapped each year and more than 100 of them are scrapped in Bangladesh. Approximately, 30% of the world’s Light Displacement Tonnes (LDT) was scrapped in Bangladesh during the period of 2000–2010. In 2011, a total of 150 ships were demolished and 143 ships were dismantled in the first half of the year 2012 (The Graveyard of Giants ByJan MÅller Hansen).

Reasons behind the development of ship-breaking industry in Bangladesh
(1) Wide spread long beach with soft sand & muddy land
(2) Low slope for beaching
(3) Large tidal difference of water depth
(4) Stable weather conditions
(5) Availability of low-cost labor
(6) Moderate enforcement of laws and low-level environmental awareness
(7) High possibility of salvaging of almost 100% scaps materials.
(8) Demand of scrap of the ships were high.

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Again, there are a few additional definite reasons for choosing the present location at Chittagong (Fauzdarhat to Kumira), for ship recycling industry in Bangladesh, (Hossain KA, Iqbal S, Zakaria NMG (2010) which are:

1. A supportive locality for to develop a heavy industry
2. Backward linkage industries within an accessible distance
3. Direct road communication with the backward linkage industries
4. Absence of any sensitive area around the yard.

The ship breaking and recycling standards: applied ISO and OHSAS certification rules and regulations

ISO 14,001:2004 (Environmental management system)

1. Environmental safety policy development and implementation.
2. Environmental hazard analysis
3. Environmental impact assessment
4. Environmental management plan implementation
5. Control of environmental pollutants

OHSAS 18,001:2007 (Occupational health and safety management system)

1. Health and safety risk assessment
2. Application of Health and safety risk prevention procedure
3. PPE application
4. Health check-up
5. Health hazard analysis
6. Health and safety audit

ISO 30,000:2009 (Ship recycling management system)

1. Application of safe and environment friendly ship recycling system.

Some of the rules regarding environment, health & safety, and training for the labor are specified below.

(a) The recycling facility shall establish, document, implement, maintain and continually improve an effective management system for the safe and environmentally sound recycling of ships in accordance with the requirements of this International Standard² and determine the fulfilment of these requirements. The facility shall define and document the scope of its management system.

(b) It ensures proper standards of safety throughout the operations of the facility, and include a commitment to human health, welfare, safety and the environment.

(c) It ensures environmentally sound recycling of ships and include a commitment to prevention of pollution.

(d) It includes a commitment to comply with applicable legal requirements and with other requirements to which the facility subscribes.

(e) It provides a framework for setting and reviewing safety and environmental performance as well as targets and objectives.

(f) It is documented, implemented, reviewed and maintained

(g) It commits to continual improvement.

(h) It is communicated to all persons working for or on behalf of the facility and is understood by them, and

(i) It is available to interested parties.

(j) The facility shall ensure that any person(s) performing tasks for it or on its behalf, or for managing or performing any related recycling duties such as contracting, import, dismantling, storage, processing, disposal or reuse etc, is (are) competent on the basis of appropriate education, training, certification or experience, and shall retain associated records.

(k) The facility shall identify training and awareness needs associated with its recycling aspects and its safe and environmentally sound recycling operation, and to include those required by law. It shall provide training and awareness programmed or takes other action to meet these needs, and shall retain associated records.

(l) The facility shall establish, implement and maintain a procedure(s) to ensure or make persons or organizations working for it, on its behalf, or performing any related recycling duties aware of

a) Legal, statutory or other regulatory requirements,

b) The importance of conformity with the management policy and procedures and with the requirements of the recycling management system,

c) The significant recycling aspects and related or actual impacts associated with their work, and the benefits of improved personal safety and environmental performance,

²ISO 30,000:2009 (Ship recycling management system), OHSAS 18,001:2007 (Occupational health and safety management system), ISO 14,001:2004 (Environmental Management System)
d) Their roles and responsibilities in achieving conformity with the requirements of the recycling management system, and
e) The potential consequences of deviation from specified procedures.

Records of competence and training shall be kept.

Training procedures shall take into account differing levels of responsibility, ability, and literacy and shall be conducted in a manner and language to ensure comprehension among all personnel receiving training.

(a) Procedures for operational control shall allow the basic workers rights, without prejudice or detriment to themselves,
1. to bring to the attention of top management or their representatives or the competent authority any hazards or risks to safety, health or the environment,
2. to appeal to the competent authority if they consider measures taken are inadequate, or considered not to comply with relevant legislation,
3. to remove themselves from an Imminent and serious risky work to their safety and health, and to allow such concerns to be immediately communicated to management representatives,
4. to adequate medical treatment and compensation for occupational injuries and diseases, and
5. to refrain from operating equipment or machinery, or entering into areas where they have not been properly trained or are not properly supervised by qualified staff.

(b) The facility shall establish, implement and maintain appropriate plans and procedures to identify potential emergency situations, potential accidents, and possible pollution events and how it will respond to them so to prevent, reduce or mitigate the impact on safety, health and the environment.

The facility shall monitor relevant external information such as forecasts of extreme weather and inform relevant stakeholders accordingly.

The facility shall respond to actual emergency situations, accidents and pollution incidents and prevent, reduce or mitigate associated adverse effect on safety, health and the environment.

The facility shall periodically review, and where necessary revise its emergency preparedness and response procedures, in particular, after the occurrence of accidents, emergency situations or pollution incidents.

The facility shall periodically test these procedures where practicable.

The facility shall establish and maintain a survey of possible and actual injuries in order to identify required immediate first aid, health facilities, and training and appropriate medical care provision.

Trainings mostly conducted for the workers internally and externally are

1. Environmental awareness about pollutants and its management
2. Health and safety risk and its management
3. Personal Protective Equipment (PPE) use
4. Working at height
5. Working in confined space
6. Fire fighting
7. First aid using
8. Emergency preparedness and response

Role of ship breaking activities in our national economy

Ship-breaking activities hold potential as it creates economic opportunities for thousands of laborers and contribute to the economic growth of regions in need of private sector investment Table 5.

Practically 100% of the ship is recycled. According to OECD (2001) report on ship scrapping: “Ship demolitions remove large volumes of obsolete tonnage from fleets, recycle many of the materials used in a ship’s construction and is a major employer in the main ship breaking areas-Bangladesh is no exception.”

The activity of ship recycling industry plays an important role in Bangladesh’s national economy. Some of which are mentioned below:

i. Reducing import dependency and save foreign currency: In Chittagong, it is the second largest industry after the commercial activity of port. Through ship recycling, the national economy can save a lot of foreign exchange by producing raw materials for steel industry and reduce the import dependency of it.

ii. Raw materials for steel industry: Since Bangladesh does not have enough iron and needs to depend on the scrapped iron to supply the steel re-rolling mills and factories. This is also an important source of the raw materials for steel plate re-manufacturing, asbestos remanufacturing, lubricating, oil regeneration, and other industries.

iii. Source of Government revenue: Government earns annual revenue of about Tk.700 crore from ship breaking each year through import duties (7.5%), yards tax (2.5%) etc.

iv. Employment generation: Ship-breaking industry offers direct employment for about 25,000 people while about 200,000 people are also engaged in different backward linkage industries.
v. Sources of building equipments: Bangladesh needs 8 million tons of building equipments of a year of which the most important material is iron and ship-breaking industry is providing 90% iron of the country (Ronning, 2000).

vi. Reusable product’s popularity to the people: Along the road side of Chittagong to Dhaka, a lot of shops are located offering almost everything to be found on a vessel. Examples are:

1. Small motors, pumps and machines (e.g., lathe),
2. Navigation equipment (e.g., sextants). – Life-saving equipment (e.g., life buoys, lifeboats, life west), flags and navigational manual,
3. Personal protective equipment (e.g., helmet, boots, gloves, overalls),
4. Chemicals and paint,
5. Different steel parts (e.g., anchor, chains, ventilation parts, pipes),
6. Toilet and sanitary equipment (e.g., toilets, sink, and bathtubs),
7. Furniture (e.g., sofa, chairs, tables, beds),

Cables and electrical wiring (undamaged cables are reused while damaged cables are burned),

1. Batteries – Insulation material (e.g., asbestos and mineral wool),
2. Kitchen equipments, dishes, canned goods and foods store of all sorts,
3. Insulation materials (e.g., asbestos and mineral wool), and Televisions, fans etc.

Methodology

The project work is based on field level primary data, which were collected from the workers of the ship breaking yard. Survey methods have its advantages over other methods and it involves shorter time, and it offers similar scope as the case of study method in collecting primary. Here, consider the workers of the ship breaking yard as a sampling unit. Information was collected from 85 workers from ship yard of Shitakund thana, Vatiari, Chittagong through questionnaires. For analysis of the data, chi square test, normal data representation, cross tabulation and logistic regression model have been used through SPSS.

3-Report on Ship scrapping, Directorate for Science, Technology and Industry – Maritime Transport Committee of the OCDE, September 2001, DSTI/DOT/MTC 12, p. 6

Tabulation, graphical representation and statistical analysis

[Figures 1-8]

Statistical analysis and interpretation

Respondent’s age and respondents experience cross tabulation

Based on the information given on respondent’s age and respondent’s working experience, the significant value of the chi-square at 5% level of significance shows that there is an association between respondent’s age and respondent’s working experience. Here, it is observed that the respondent age highly affects their working experience.

Respondent’s education and respondent’s experience cross tabulation

From the above data Table 1 given on respondent’s education and respondent’s working experience, the insignificant value of the chi-square at 5% level of significance represents that there is no association between respondent’s education and respondent’s working experience.

Respondents education and uses of PPE Cross tabulation

According to the information given on respondent’s education and nature of using PPE (personal protective equipment), the significant value of the chi-square at 5% level of significance characterizes that there is an association between respondent’s education and nature of using PPE(personal protective equipment). Here it is observed that the respondents’ education highly affects their use of the nature of PPE.

Opportunity of training and confirmation of risk awareness Cross tabulation

Regarding the data given on respondent’s opportunity of training and confirmation of risk awareness Table 7 and 8, the significant value of the chi-square

| Table 1. Respondent’s experience. | Frequency | Percent |
|----------------------------------|-----------|---------|
| below 1 year                     | 23        | 27.1    |
| 1–15 years                       | 33        | 38.8    |
| 16 and above                     | 29        | 34.1    |
| Total                            | 85        | 100.0   |
at 5% level of significance characterizes that there is an association between respondent’s opportunity of training and confirmation of risk awareness. Here it is observed that the respondent’s opportunity of training highly affects their confirmation of risk awareness.

**Opportunity of training and awareness of environmental rules for ship yard cross tabulation**

Based on the information given on respondent’s opportunity of training and awareness of environmental rules for ship yard, the significant value of the chi-square at 5% level of significance portrays that there is an association between respondent’s opportunity of training and awareness of environmental rules for ship yard. Here it is observed that the respondent’s opportunity of training highly affects their awareness of environmental rules for ship yard Table 10 and 11.

**Opportunity of training and serious physical problem faced by the respondents after joining job Cross tabulation**

Regarding the data given on respondent’s opportunity of training and serious physical problem faced by the respondents after joining job, the insignificant value of the chi-square at 5% level of significance represents that there is no association between respondent’s opportunity of training and serious physical problem faced by the respondents after joining job.

**Medical support to the respondents and physical problem faced by the respondents after joining job cross tabulation**

According to the information given on medical support to the respondents and physical problem faced by the respondents after joining job, the significant value of the chi-square at 5% level of significance portrays that there is an association between respondent’s opportunity of training and medical support to the respondents. Here it is observed that medical support to the respondents highly affects the respondent’s health.

**Binary logistic representation of serious physical problem relative to different characteristics**

**Opportunity of training**

It has been found that there is a significant association between serious physical problem and opportunity of training Table 2. The respondents who do not get training are 0.355 times more likely in risk of getting seriously injured than the respondents who do get training.

**Uses of PPE**

Based on the information, it has been seen that there is a highly significant relationship between using PPE (personal protective equipment) and falling in serious physical sickness or injury. The respondents who are using the PPE’s are likely to get seriously injured 13.949 times less likely than who are not using PPE’s.

**Confirmation of risk awareness**

According to the data, it has been found that there is a significant association between serious physical problem and confirmation of risk awareness. The respondents who are aware of risk are 3.926 times less likely faces fatal physical problem than who are not aware of those rules.

**Way of confirmation of risk awareness**

From the above information, it has been shown that there is a significant relationship between way of communication of risk awareness and serious physical problem. The respondents who are getting regular internal and external training are facing fatal physical problem 0.138 times more likely than those who are getting daily refresher training. Again, the respondents who are not getting any training are facing fatal physical problem 9.662 times more likely than those who are getting daily refresher training.

**Respondent’s familiarity to environment pollution caused by this sector**

Regarding the information given, it has been seen that there is a significant relationship between respondent’s familiarity to environment pollution caused by this sector and serious physical problem. The respondents who are conscious about environment pollution caused by this sector are getting physically sick 0.544 times less likely than who are not conscious about it.

**Rules followed by the respondents**

According to the data, it has been shown that there is a significant relationship between respondent’s
maintenance of rules and serious physical problem. The respondents those who are not maintaining the environmental rules fully are falling in serious physical problem 6.868 times more likely than who are maintaining the rules regarding environment moderately.

**Summary**

(1) The highest proportion of the respondent’s (38.8%) working experience lies between 1 and 15 years. 34.1% of the respondents have experience below 1 year. The least proportion of them, that is 27.1% are experienced 16 and above 16 years.

(2) Regarding the data on respondent’s technical competency, 54% respondents had no technical competency before joining the job while 34% of them were technically competent before joining the job Table 3.

(3) From the data on worker’s opportunity of the training, the majority of the respondents (43%) got the training but 42% of them did not get any training.

(4) According to the information given on respondent’s training place Table 4, the greatest proportion of the respondents (49.4%) has no idea of training. The lowest proportion of respondents (10.6%) gets the external training.

(5) Considering the information on respondent’s nature of using personal protective equipment, 64.7% of the respondents use PPE whereas 35.3% of them do not wish to do it.

(6) Based on the data on respondent’s health check-up, 56.5% do not get any health check-up yet 43.5% of the respondents get the health check-up facility Table 6.

(7) According to the information given on the respondent’s confirmation of risk awareness, the greatest proportion of the respondents (83.5%) is aware of risk while 16.5% workers are not aware of it.

(8) Regarding the data on respondent’s way of conformity of risk awareness, regular internal and external training covers 61.2% of the workers. 22.45% of the workers participate daily refresher training compared to 16.5% of them are not aware of it.

(9) From the data on respondent’s confirmation period of environmental pollution Table 9
caused by this sector, 41.2% participants are not apprised of this type of problem. Only 20% of them are getting noticed after training.

(10) Considering the information on participant’s awareness of environmental rules for the shipyard, 62.4% of them is not concerned compared to 37.6% of the respondents is apprised of it.

(11) Based on the data given on respondent’s supporting to the environmental rules, 62.4% of the respondents are not interested to follow it but 37.6% of them are following the rules moderately.

(12) Regarding the information given on respondent’s age, 55% of them belong to the age group 15–24. The lowest proportion of them (22%) aged 35 and above.

(13) According to the data on educational background of the worker, the highest proportion of them (47%) pertains to the group secondary and above. 27% of the workers are illiterate while 26% of them attended primary school.

(14) From the data given on worker’s technical competency before joining the job, 63.5% of them are unskilled before joining the job. However, 36.5% of the respondents are technically sound before joining the job.

(15) Based on the information given on respondent’s work competency, 61.2% of the respondents can support only one sector. Three and above sectors can be operated by 25.9% of the respondents.

(16) Regarding the data given on facilities for the workers, the greatest proportion of the respondents (48%) is getting three and four facilities. The least proportion of the respondents that constitutes 19%, use to enjoying one and two facilities.

(17) Considering the information given on medical support to the respondents, 56% of the respondents are getting full medical support. 19% of them are primarily supported by the medical team of the yard.

(18) According to the data given on respondent’s familiarity to environment pollution caused by this sector, 58.8% of the respondents are acknowledged of it while 41.2% of them are not attentive to it.

(19) Based on the information given on respondent’s age and respondent’s working experience, the significant value of the chi-square at 5% level of significance shows that there is an association between respondent’s age and respondent’s working experience.

(20) From the data given on respondent’s education and respondent’s working experience, the insignificant value of the chi-square at 5% level of significance represents that there is no
(23) Based on the information given on respondent’s opportunity of training and awareness of environmental rules for ship yard, the significant value of the chi-square at 5% level of significance portrays that there is an association between respondent’s opportunity of training and awareness of environmental rules for ship yard.

(24) Regarding the data given on respondent’s opportunity of training and serious physical problem faced by the respondents after joining job, the insignificant value of the chi-square at 5% level of significance represents that there is no association between respondent’s opportunity of training and serious physical problem faced by the respondents after joining job.

(25) According to the information given on medical support to the respondents and physical problem faced by the respondents after joining job, the significant value of the chi-square at 5% level of significance portrays that there is an association between problem faced by the respondents after joining job and medical support to the respondents.

(26) The respondents those who are not maintaining the environmental rules fully are falling in serious physical problem 6.868 times more likely than who are maintaining the rules regarding environment moderately.
The respondents who are not conscious about environment pollution caused by this sector are getting physically sick 0.544 times more likely than who are conscious about it.

The respondents who do not get training are 0.355 times more likely in risk of getting seriously injured than the respondents who do get training.
The respondents who are not using the PPEs are likely to get seriously injured 13.949 times more likely than who are using PPEs.

The respondents who are not aware of risk are 3.926 times more likely faces fatal physical problem than who are aware of those rules.
The respondents who are getting regular internal and external training are facing fatal physical problem 0.138 times more likely than those who are getting daily refresher training. Again, the respondents who are not getting any training are facing fatal physical problem 9.662 times more likely than those who are getting daily refresher training.

Conclusion

The study of "Impact of international standard system application: In the context of ship recycling industry of Bangladesh" having a look at the effect of executing the international standards to the ship recycling industry. In past we were not aware of using this type of rules. After maintaining it we can follow up how it will help the conniver to know what is happening. It will also clear the actual scenario of labor whether they are getting facilities and uphold the rules or not. It is also expected that this study will help the owner of the yard to get an overview of the condition of his/their yard. It may help them to take further step to solve...
problems and planning for the future. Government is imposing some ship recycling related rules for the betterment of the yard owners and for the workers and environment too. It is noticed that still almost half of the workers are not getting training which is very important for them. Again, majority of the workers are not aware of the environmental pollution caused this sector. So, this type of training for the workers should organize regularly both internally or externally. Proper guidance can make the workers more effective for the yard. Furthermore, over fifty percent of the workers do not get full body check up from the yard. In this sector yard owners need to give more emphasis. Among all the respondents only a few are maintaining rules regarding environment. Management has to strict them to follow the rules for their own sake.

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| Independent variables | Category | B      | Sig. | Exp(B) |
|-----------------------|----------|--------|------|--------|
| Opportunity of training | Yes      | 22.317 | .035 |        |
|                       | No       | 1.036  | .355 |        |
| Uses of PPE           | Yes      | 13.976 | .015 |        |
|                       | No       | −2.635 | .000 | 13.949 |
| Confirmation of risk awareness | Yes |        |      |        |
|                       | No       | −19.788 | .017 | 3.926  |
|                      | daily refresher | 20.365 | .020 |        |
|                      | regular internal and external training | 1.978 | .029 | .138  |
|                      | not applicable | .610   | .042 | 9.662  |
| Respondent’s familiarity to environment pollution caused by this sector | Yes | 18.253 | .019 |        |
|                       | No       | −1.927 | .013 | .544   |
| Rules followed by the respondents | Yes | 12.341 | .025 |        |
|                       | No       | 1.036  | .028 | 6.868  |