



Determinants of the Green Industrialization on Climatic basis in Bangladesh

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KeyWords

Green Industrialization, Ecofriendly, RMG, Climate, Contribution.

ABSTRACT

The main focus of this study was to the determinants of green industrialization of Ready Made Garment (RMG) in Bangladesh. Data were collected from a sample of randomly selected 263 RMG Workers and Supervisors out of 840 from the mentioned two (2) RMGs. The study was conducted during the time from 02 June 2019 to 30 August 2019. Eleven (11) selected characteristics of the RMG Workers and Supervisors were considered as the independent variables for determine the extent of green industrialization. Due to misleading results from multi-collinearity, step-wise multiple regression and path analyses were used to explore the contribution and effect of the selected characteristics of the RMG Workers and Supervisors to/on the green industrialization of RMGs as perceived by them. The analyses indicated that out of 11 variables only 4 variables namely decision making ability, knowledge, cosmopolitnness and education had significant contribution and effect to/on the green industrialization of RMGs as perceived by the Workers and Supervisors. The result indicated that the whole model of 11 independent variables explained 63.5 per cent of the total variation in green industrialization of RMG.

THIS document is a template for Microsoft Word versions 6.0 or later. If you are reading a paper version of this document, please **INTRODUCTION:**

The Green Industry encourages sustainable forms of production and consumption energy i.e. patterns that are resource and energy efficient, low-carbon emission and low waste matters, non-polluting and safe, and which produce that are responsibly managed throughout their green cycle. It also aims to create green industries, that deliver ecofriendly environmental goods and services in an industrial manner, including, waste management and recycling services, renewable energy technologies, and environmental analytical and advisory services. The green industry has positive effects on establishing environmental management system as well as create green workplaces, occupational health, workplace safety, efficient use of chemicals, and finally increased productivity and cost savings. As sustainable practices and eco-friendly operations are emerging as a global aspect in the developed countries, compelled to set up the green factories to cope up with the world standards, ushering in a new era (Ahmed and Islam, 2014). According to United States Green Building Council (USGBC) certified as "green" a factory must be purely compliant, and all the elements used in the factory have to be tested by the US-based Green Building Concept (GBC). In Bangladesh 67 garment factories have received green certificate award from United States Green Building Council (USGBC). The USGBC is a standard authority to provide green certificate in three categories: Leed Platinum, Leed Gold and Leed Silver. However the sector expressed satisfaction over export performance and expected that this trend will help RMG to reach USD 50 billion within 2021. The satisfaction over export performance and expected that this trend will help RMG to reach USD 50 billion within 2021. These factories have been actively participating in the betterment of the environment such as central running effluent treatment plants (ETPs), using energy efficient technologies and installing renewable energy technologies and creating the business eco-friendly in general for the factories. The concept of green industrialization and some related matters, determinants of green industrialization in RMG sector of Bangladesh as perceived by the workers and supervisors, contribution of the selected characteristics of the RMG workers and supervisors to the determinants of green industrialization in RMG sector.

MATERIALS AND METHODS

The purpose of the present study was to determinants of green industrialization of RMG in Bangladesh as perceived by the workers. This research work was conducted on purposively selected two readymade garments (RMG) in Bangladesh. The RMG workers and supervisors the garments of the selected was which constituted the population of the study. Sample size calculator developed by Creative Research System (Yin, R. K. 1984) was used to determine the sample size. By setting the population number of 840 with 95% confidence level and confidence interval of 5, the sample size was determined as 263 which distributed proportionately among the two garments workers and supervisors. Separate list of the population of workers and supervisors of the two RMGs were collected from the authority of the garments. Sample respondents were selected randomly and proportionately from the population. Fourteen (14) workers and supervisors were selected for the reserve list those were interviewed in the cause of absence of any respondents listed in the main sample size of 263.

The Variables and their Measurement

Various characteristics of the RMG workers and supervisors were considered as the causal variables of the study. These were age, educational, family size, yearly salary, yearly savings, training exposure, cosmopolitaness, decision making ability, service length, knowledge on green industrialization and problem faced in garments.

Green industrialization of RMG

Green industrialization of RMG was the main focus of the study. According to U S Green Building Council (USGBC 2009) 9 (nine) factors affected to establish in green industry of RMG sectors. These factors are: i) building Construction materials that will emit less CO₂ emission (to use recycled brick, cement, and prefabricated steel to accomplish construction), ii) assure factory workers housing facilities, iii) assure schools for children's for workers, iv) nearby market for shopping for workers, v) assure bus or tempo stand for transportation between 500 square meters from factory building, vi) ensure enough sunlight and solar power utilization to reduce the cost of electricity, vii) reduce the use of underground water, need to encourage for rainwater reservoir and water-saving faucet ,viii) keep about 50% free space of total factory premises, ix) ensure enough trees in the factory ground and keep enough ventilation facilities to protect heat and ensure self anti fire instrument and training facilities.

Respondents were asked to indicate their degree of agreement against each of the items of step taken by the RMG authority before and after involvement in green industrialization along with a four-point scale as high, medium, low and not at all. Scores were assigned to these four alternative responses as 3, 2, 1, and 0 respectively for each item. The determinants of green industrialization Impact of each item was measured by deducting the score against before situation from after involving with green industrialization. Finally green industrialization as perceived by each respondent was measured by adding his/ her score against all the 15 items. Thus the possible score of green industrialization ranked from 0 to 45, where 0 indicated no green industrialization and 45 indicated highest green industrialization in RMG.

On the basis of objectives of the study collected, data were compiled, coded and analyzed. The statistical measures such as range, mean, percentage distribution, standard deviation, rank order, categories etc was used to interpret the data. Step wise regression test was used to determine the contribution of the selected characteristics of the respondents on their perceived green industrialization. To compare the step taken by the green and non-green RMG for green industrialization, simple t-test was used. Five (5%) per cent level of significance was used to reject null hypothesis.

RESULTS AND DISCUSSIONS

The purpose of this study was to examine the contribution and effect of selected characteristics of the RMG workers and supervisors to/on their perceived green industrialization of RMG in Bangladesh. Green industrialization of RMGs in Bangladesh as perceived by the workers and supervisors was the dependent variable (Y) of the study. Eleven (11) selected characteristics of the workers and supervisors viz age (X₁), education (X₂), family size (X₃), yearly salary (X₄), yearly saving (X₅), training exposure(X₆), cosmopolitaness (X₇), decision making ability (X₈), service length (X₉), knowledge on green industrialization (X₁₀) and problem faced in garments (X₁₁) were the independent variables many of the scales of the variables were ordinal level measurement. Spearman rank order correlation test was initially run to test the relation between each of the independent variables and green industrialization of RMG in Bangladesh. Correlation analysis showed that family size (X₃) of the respondents had no significant relationship with green industrialization, problem faced in garments (X₁₁) had significantly negative relationship with green industrialization and other nine (9) age (X₁), education (X₂), yearly salary (X₄), yearly saving (X₅),training exposure(X₆), cosmopolitaness (X₇), decision making ability (X₈), service length (X₉), knowledge on green industrialization (X₁₀) the of workers and supervisors of RMG had significant positive relationship with their perceived green industrialization in RMG in Bangladesh.

Direct and Indirect Effects of the Selected Characteristics of the RMG workers and supervisors on their perceived green industrialization

In the present study Spearman rank correlation and stepwise multiple regression analysis were conducted. It is not possible to find out the direct effects and indirect effects separately by these tests. But, in path analysis, it is possible to get direct effects and indirect effects separately. Path coefficient is simply a standardized partial regression coefficient and as such measures the direct influence of one variable upon another and permits the separation of the correlation coefficient into components of direct and indirect effects (Dewey and Lu, 1959). This allows the direct effect of an independent variable and its indirect effect through other variables on the dependent vari-

able (Sasmal and Chakrabarty, 1978). Path coefficient analysis was employed in order to obtain clear understanding of the direct and indirect effects of selected independent variables. Path analysis was done involving the significant variables of step-wise multiple regression analysis. Similar procedure may followed by Ali (2008), Hossain (2017) and Ahamed (2019). Direct effect of an independent variable on the dependent variable is the standardized beta co-efficient (value of 'b' of regression analysis) of the respective independent variable. Whereas indirect effect of an independent variable through a channeled variable was measured by the formula used by Hossain (2017) with slight modification as follows:

$$e = b_c \times \rho_{ic}$$

Where, e = indirect effect of an independent variable through a channeled variable

b_c = Direct effect of the variable through which indirect effect is channeled (channeled variable)

ρ_{ic} = Spearman correlation co efficient between respective independent variable and variables through which indirect effect was channeled

Total indirect effect of an independent variable was determined by adding the indirect effects of that variable though channeled variables. Path coefficients showing the direct and indirect effects of significant 4 independent variables of step-wise multiple regression analysis on the green industrialization of RMG in Bangladesh presented in Table.2. Analysis of data furnished in Table 2 indicated that among the independent variables, decision making ability (X_8) had the highest direct positive effect (0.370) in the direction on workers and supervisors perception on ' green industrialization of RMG in Bangladesh'. Knowledge (X_{10}) and cosmopolitness (X_7) had appreciable positive direct effect green industrialization of RMG in Bangladesh. Education (X_2) had the lowest direct effect (0.113) in the positive direction on green industrialization of RMG in Bangladesh. Here, it may be mentioned that without path co-efficient analysis it is not possible to know the indirect effects of an independent variable through other variables on the dependent variable. Therefore, emphasis has been given on the indirect effects which have been obtained from path co-efficient analysis as shown in Table 2.

Table 2 Path coefficients showing the direct and indirect effects of 4 significant independent variables of stepwise multiple regression analysis on green industrialization of RMG

| Independent Variables | Variables through which indirect effects are channeled | Indirect effects | Total Indirect Effects | Direct Effect |
|-----------------------------------|--|------------------|------------------------|---------------|
| Decision making ability (X_8) | Cosmopoliteness (X_7) | 0.101 | 0.233 | 0.370 |
| | Knowledge (X_{10}) | 0.095 | | |
| | Education (X_2) | 0.037 | | |
| Knowledge (X_{10}) | Decision making ability (X_8) | 0.119 | 0.287 | 0.295 |
| | Cosmopoliteness (X_7) | 0.103 | | |
| | Education (X_2) | 0.065 | | |
| Cosmopoliteness (X_7) | Decision making ability (X_8) | 0.146 | 0.268 | 0.258 |
| | Knowledge (X_{10}) | 0.118 | | |
| | Education (X_2) | 0.044 | | |
| Education (X_2) | Knowledge (X_{10}) | 0.168 | 0.391 | 0.113 |
| | Decision making ability (X_8) | 0.123 | | |
| | Cosmopoliteness (X_7) | 0.100 | | |

On the basis of path analysis, the independent variables having indirect effects on green industrialization of RMG have been presented below in descending order.

Path analysis showed that education (X_2) had the highest total indirect effect (0.391) and a positive direct effect of 0.113 (Table 2) on green industrialization of RMG. The indirect effect was mostly channeled positively through Knowledge (X_{10}), decision making ability (X_8) and cosmopoliteness (X_7). Therefore, it may be inferred that other variables remaining constant, decision education (X_8) was a determinant of the perception of RMG workers and supervisors on green industrialization of RMG. Path analysis showed that Knowledge (X_{10}) had the 2nd highest total indirect effect (0.287) and a positive direct effect of 0.295 (Table 2) on green industrialization of RMG. The indirect effect was mostly channeled positively through decision making ability (X_8) and cosmopoliteness (X_7). The indirect effect of Knowledge (X_{10}) was somewhat positively channeled through education (X_2). Therefore, it may be inferred that other variables remaining constant, Knowledge (X_{10}) was a determinant of the perception of RMG workers and supervisors on green industrialization of RMG. Path analysis showed that cosmopoliteness (X_7) had the 3rd highest total indirect effect (0.268) and a positive direct effect of 0.258 (Table 2) on green industrialization of RMG. The indirect effect was mostly channeled positively through decision making ability (X_8) and knowledge (X_{10}). The indirect effect of cosmopoliteness (X_7) was somewhat positively channeled through education (X_2). Therefore, it may be inferred that other variables remaining constant, cosmopoliteness (X_7) was a determinant of perception of RMG workers and supervisors on green industrialization of RMG. Path analysis showed that decision making ability (X_8) had the 4th highest total indirect

effect (0.391) and highest positive direct effect of 0.370 (Table 2) on green industrialization of RMG. The indirect effect was mostly channeled positively through cosmopolitanism (X_7). The indirect effect of decision making ability (X_8) was somewhat positively channeled through knowledge (X_{10}) and education (X_2). Therefore, it may be inferred that other variables remaining constant, decision making ability (X_8) was a determinant of the RMG workers and supervisors perception of green industrialization of RMG.

Contribution and effect of the selected characteristics of RMG workers and supervisors to/on the green industrialization

The stepwise multiple regression analysis, it was found that out of 11 individual variables, namely age (X_1), education (X_2), family size (X_3), yearly salary (X_4), yearly saving (X_5), training exposure (X_6), cosmopolitanism (X_7), decision making ability (X_8), service length (X_9), knowledge on green industrialization (X_{10}) and Problem faced in garments (X_{11}) of the RMG workers and supervisors only four (4) independent variables were entered into regression equation such as decision making ability (X_8), knowledge on green industrialization (X_{10}), cosmopolitanism (X_7) and education (X_2) with green industrialization of RMG sector (Y) as the dependent variable. The result indicated that the whole model of 11 independent variables explained 63.5 percent of the total variation in green industrialization of RMG. But since the standardized regression coefficient of 4 variables formed the equation and were significant, it might be assumed that whatever contribution was there, it was due to these 4 variables.

Conclusions

On the basis of the findings of the study and the logical interpretation of their meaning in the light of the other relevant facts enabled the researcher to draw the following conclusions:

1. The findings indicated that knowledge on green industrialization of the RMG workers and supervisors had second highest contribution on their perception on green industrialization in Bangladesh. The indirect effect of knowledge on green industrialization was mostly channeled through education, cosmopolitanism and decision making ability. Therefore, it may be concluded that knowledge of the RMG workers and supervisors was an important factor to form correct perception on green industrialization of RMG sector in Bangladesh.
2. The findings indicated that cosmopolitanism of the RMG workers and supervisors had third contribution on their perception on green industrialization in Bangladesh. The indirect effect of cosmopolitanism was mostly channeled through knowledge, education and decision making ability. Therefore, it may be concluded that cosmopolitanism of the RMG workers and supervisors was an important factor to form correct perception on green industrialization of RMG sector in Bangladesh.
3. The findings indicated that education of the RMG workers and supervisors had fourth contribution on their perception on green industrialization in Bangladesh. The indirect effect of education was mostly channeled through knowledge, decision making ability and cosmopolitanism. Therefore, it may be concluded that education of the RMG workers and supervisors was an important factor to form correct perception on green industrialization of RMG sector in Bangladesh.

Acknowledgement

Heartfelt thanks and appreciation are also expressed to Bangladesh Knitwear Manufacturers and Exporters Association (BKMEA) Officials and RMG owners for their benevolent help and co-operation in data collection during the interview of the respondents. Special thanks to the RMG owners of the study area who gave their valuable time during interviews for the collection of the data.

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