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INTERACTION EFFECTS OF SKILL AND MOTIVATION ON WORK PERFORMANCE[#]

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The present study investigated the interaction effects of skill and motivation on the performance of industrial workers of Bangladesh. The study was also designed to measure and compare the motivation levels of the workers of private and public sectors. The study was conducted on a sample of 200 workers from two textile mills, one from private sector and other from public sector (taking 100 workers from each mill). They were selected randomly by using Random Number Table. The findings of the study indicated significant main effects and interaction effects of skill and motivation on the performance of the workers of both private and public sectors. The results further show that the workers of private sector are significantly better than their counterparts in the public sector in terms of their motivation.

Work performance, which refers to the degree to which an individual executes his or her roles with reference to certain specified standards set by the organization is central to any organization (Nayyar, 1994). It is a complex phenomenon that depends on various factors. Hence, it needs to be studied with a multidimensional approach. A number of studies (e.g., Fleishman, 1958; French, 1957; Locke, Mento, & Katcher, 1978; Vroom, 1960; Wyatt, 1934) have been conducted to determine the effects of ability and motivation on performance. Most of these researches have been done as laboratory studies on fairly simple tasks. An attempt has been made in the present study to assess the interaction effects of skill and motivation on the performance of industrial workers of Bangladesh. Review of past studies on work performance in Bangladesh reveals that little or no work has yet been done in this particular area in the industrial

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organizations of Bangladesh. So, there is a need to make a study in this area in our socioeconomic context. The present study assumes a great deal of importance in bridging up the existing gap in our present level of information in this field. A study in this particular area may be useful for academic as well as practical purposes.

The present study specifically focused on the following objectives:

(i) To evaluate the interaction effects of skill and motivation on the performance of the workers of private sector;

(ii) To assess the interaction effects of skill and motivation on the performance of the workers of public sector;

(iii) To measure and compare levels of motivation of the workers of private and public sectors; and

(iv) To make suggestions for managerial policy implication in the light of the findings of the present study.

METHOD

Sample

The sample consisted of 200 workers selected randomly from two textile mills (100 workers from each mill) located at Tongi, near Dhaka city in Bangladesh under private and public sector. In selecting the samples a list of workers (cone winders and reelers) of the finishing section of each mill was prepared with the help of the Time Offices (which keep records of the time of entry and exit of each worker working in the mill under different shifts) of each mill. Serial numbers were assigned to the names of the workers in the list of each mill and 200 workers, taking 100 from each mill were drawn out of this list using Random Number Table. 200 workers were sampled out from a total number of 974 production workers (total number of production workers of the private and the public sector textile mills were 554 and 420, respectively) of these two mills. All the workers of the two mills were men. Table A and B shows the demographic variables of the sample.

Table A

Demographic Variables of the Sample of Workers from the Private Sector (N = 100)

Age (Years)	Experience (Years)	Education (%)	Total Wage Per Month (Taka)	Workers Married (%)	Workers Trained (%)
Range 22-45	Range 3-26	Illiterate (06%) Primary (46%) Secondary (47%) Higher Secondary (01%)	Range 2000.00 to 3300.00	(87%)	(03%)
Mean 30.11	Mean 09.15		Mean 2779.58		

Table B

Demographic Variables of the Sample of Workers from the Public Sector (N = 100)

Age (Years)	Experience (Years)	Education (%)	Total Wage Per Month (Taka)	Workers Married (%)	Workers Trained (%)
Range 25-52	Range 1-34	Illiter (17%) Primary (56%) Secondary (27%)	Range 1400.00 to 2600.00	(97%)	(04%)
Mean 36.09	Mean 14.51		Mean 2088.00		

Comparison of Table A and Table B shows that the workers of private sector textile mills are younger, less experienced, better

educated and better paid than their counterparts in the public sector. The Table B also indicates that the private sector textile mill recruits workers who have a minimum of 3 years experience.

Instrument

The motivation of the sample of workers was measured with the help of the Motivation Scale devised by Nadler and Lawler (1977), which was slightly modified to suit the needs of the present study. Nadler and Lawler (1977) have based their scale on three key components of Expectancy Theory namely, Performance-Outcomes Expectancy, Valence of Outcomes (V), and Effort-Performance (E-P) Expectancy. The scale, therefore, is composed of three different sets of questions. Question 1 contains thirteen items which measure performance-outcome expectancies. Each item is rated on a 5-point scale anchored at each point with 'not at all likely', 'somewhat likely', 'moderately likely', 'quite likely', and 'extremely likely'. Question 2, consisting of thirteen items to measure valences of outcomes is also a 5-point scale with response categories arranged as 'not at all important', 'somewhat important', 'moderately important', 'quite important', and 'extremely important'. Three items, measuring 'effort-performance expectancies' comprises the third set of Questions. In this case also, the responses are scored on a 5-point scale by choosing one answer from the following options: 'never', 'sometimes', 'often', 'almost always', and 'always'. Since, the scoring weight for each item ranges from 1 to 5, therefore, the range of possible total scores is from 1 to 125. The score 27 being the mid point for all the items of the three questions taken together. Any score on or above the score of 27 is regarded as high motivation and a score falling below this score represents low motivation. The responses were scored according to the procedure provided by the author of the scale which was as follows:

(a) For each of the possible outcomes listed in Question 1 and 2, the score for the outcome on Question 1 (P-O expectancies) was multiplied by the corresponding score on Question 2 (valence of outcomes). Thus, score of 1a was multiplied by score of 2a, and score of 1b by score of 2b, etc.

(b) All of the 1 times 2 products were added together to get a total of all expectancies times valences.

(c) The total was divided by the number of pairs (in this case thirteen) to get an average expectancy-times-valence score.

(d) The scores from question 3 (E-P expectancies) were added together and then divided by three to get an average effort-performance expectancy score.

(e) The score obtained in step c (the average expectancy time valence) was multiplied by the score obtained in step d (the average E-P expectancy score) to obtain a total motivation score.

The subjects were divided into high and low motivated groups only in a relative sense as the score yielded by the motivation scale used in this study can be interpreted only in terms of where the individuals' score falls relative to the distribution of scores of other people in the group. This score does not have any absolute meaning. Test retest reliability coefficient of the scale was found to be .61 ($p<.001$).

Procedure

Data for the present study were collected on a person to person interview basis. All the respondents were contacted in the factory during working hours and they were explained the purpose of the study. They were told that the study was an academic exercise and had nothing to do with their company management or any other external agency. They were also assured confidentiality that whatever they would respond would be kept secret. The sittings were arranged in suitable rooms provided by the authority of the mills. The researcher himself interviewed the respondents with the help of the questionnaire. Because of the illiteracy or poor literacy of the workers, who could hardly read or write, the questionnaire was treated as interview schedule.

As to the records of production, the assistant managers (technical) in charge of the production sections of each mill were requested to present records of production of each of the sample of workers in separate proforma for each worker for the last three months' records of production.

Several problems were faced regarding collection of production data. First, units of measurement of production record varied from one plant to another. For example, kilogram was the unit of measurement in public sector and pound was the unit of measurement in private sector. Secondly, a number of varieties of yarn of different qualities are produced in these mills. In the face of these difficulties, to get comparable objective measures of output, attempt is made to use the standard output estimates (i.e., the running targets) for each 'count of yarn' made by the management. The actual production of each worker

was converted into hundred of the running targets fixed by the management of the concerned mills for each type of yarn and this was taken as the performance level of the workers.

Skill ratings were taken in separate sheets from the respective supervisor of each subject after the respondent finished filling out the questionnaire. As to the skills of the workers, supervisors were asked to rate the sample of workers on a high and low-skilled continuum on the basis of the worker's previous performance. This method has been used by many researchers (e.g., Fleishman, 1958; Harder, 1991) as a measure of workers' general ability. It is assumed that the shift in charge/supervisors were the right persons to rate their workers, since they were supposed to be in close contact with the workers and they had the greatest opportunity to observe them at work. Biases may be there, but still they (shift in charge/supervisors) are their (subjects') best judges.

RESULTS AND DISCUSSION

Results of the study have been summarized in Tables 1 to 7.

Table 1

Summary of Two-Way ANOVA for Performance by Skill (Low-High) and Motivation (Low-High) of Workers (Private and Public Sectors Taken Together)

Sources of Variation	*SS*	*df*	*MS*	*F*	*p*
Main Effects of Skill	4052.04	1	4052.04	60.71	.001
Motivation	3973.70	1	3973.70	59.54	.001
2-Way Interactions	577.83	1	577.83	8.66	.004
Residual	13082.14	196	66.75		
Total	21685.71	199			

Analysis of the data was made to see main effects and the interactions, if any, between skill (low – high) and motivation (low – high) on performance. It is evident from the results (Table 1) that *F*-ratios for two-way interaction (8.66) and for the main effects of skill (60.71) and motivation (59.54) are statistically significant. This means that skill and motivation separately produce a significant difference in performance as well as their interaction makes significant difference in performance of the workers of both private and public sectors taken together.

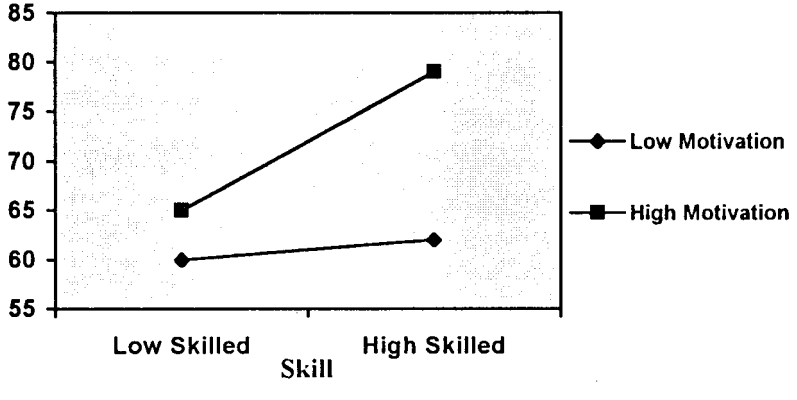
Table 2

Cell Means (Including Rows and Columns) for the ANOVA Presented in Table 1

	Low-skilled	High-skilled	Total
Low Motivated	59.42 (24)*	63.22 (34)	61.65 (58)
High Motivated	65.36 (86)	76.78 (56)	69.86 (142)
Total	64.06 (110)	71.66 (90)	67.48 (200)

**Values within parenthesis represent sample size.*

Figure 1



Interaction Effects of Skill (Low-High) and Motivation (Low-High) on Performance

Figure 1 plots the cell means shown in Table 2. Levels of skill (low-high) are shown on the X-axis and the mean performance of the workers is shown on the Y-axis. Figure 1 plots the mean performance of low-motivated workers corresponding to the two levels of skill (low-high) and joins the points (59.42 and 63.22). The resulting curve is labeled Low-motivation. Figure 1 also shows the performance of high-motivated workers corresponding to the two levels of skill and joins the points (65.36 and 76.78). The resulting curve is labeled High-motivation. It is evident that the two curves are not parallel. The difference in performances between the two motivation conditions (low-high) was significantly greater for High-skilled workers than for Low-skilled workers. Thus, motivation has differential effect on performance of the high and low skilled workers. Therefore, it may be concluded that there is a significant interaction effect of motivation and skill on performance of the workers.

Table 3

Summary of Two-Way ANOVA for Performance by Skill (Low-High) and Motivation (Low-High) of the Workers of Private Sector

Sources of Variation	*SS*	*df*	*MS*	*F*	*p*
Main Effects of Skill	3583.04	1	3583.04	54.80	.001
Motivation	3629.84	1	3629.84	55.51	.001
2-Way Interactions	375.23	1	375.23	5.74	.019
Residual	6277.09	96	65.39		
Total	13865.20	99			

It is evident from the results (Table 3) that *F*-ratios for two-way interactions (5.74) and for the main effects of skill (54.80) and motivation (55.51) are statistically significant. This means that skill and motivation individually produced significant difference in the performance as well as they interacted significantly to produce differences in the performance of the workers of private sector textile mills.

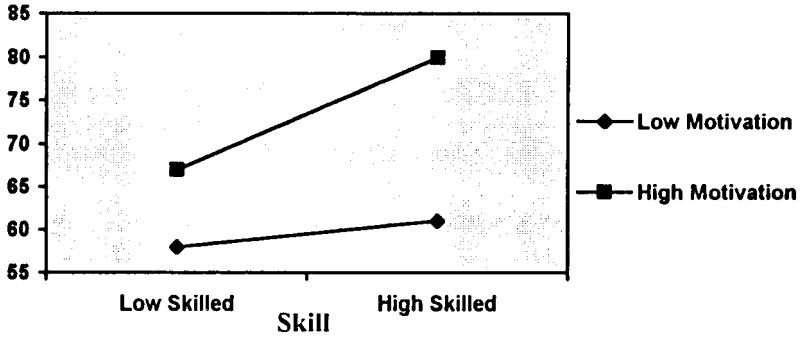
Table 4

Cell Means (Including Rows and Columns) for the ANOVA Presented in Table 3

	Low-skilled	High-skilled	Total
Low Motivated	57.85 (8)*	63.06 (15)	61.24 (23)
High Motivated	67.11 (51)	82.00 (26)	72.14 (77)
Total	65.85 (59)	75.07 (41)	69.63 (100)

*Values within parenthesis represent sample size.

Figure 2



Interaction Effects of Skill (Low-High) and Motivation (Low-High) on Performance of the Workers of Private Sector

Figure 2 plots the cell means shown in Table 4. Levels of skill (low-high) are shown on the X-axis and the mean performance of the workers is shown on the Y-axis. Figure 2 plots the mean performance of Low-motivated workers corresponding to the two levels of skill (low-high) and joins the points (57.85 and 63.06). The resulting curve is labeled Low-motivation. This figure also shows the performance of high-motivated workers corresponding to the two levels of skill and joins the points (67.11

and 82.00). The resulting curve is labeled High-motivation. It is evident that the two curves are not parallel. The difference in performances between the two motivation conditions (high-low) was significantly greater for high-skilled workers than for low-skilled workers. Thus, motivation has differential effect on performance of the high and low skilled workers. Therefore, it may be concluded that there is a significant interaction effect of motivation and skill on performance of the workers.

Table 5

Summary of Two-Way ANOVA for Performance by Skill (low-high) and Motivation (low-high) of the Workers of Public Sector

Sources of Variation	*SS*	*DF*	*MS*	*F*	*p*
Main effects of Skill	1305.97	1	1305.97	24.73	.001
Motivation	772.69	1	772.69	14.63	.001
2-way interactions	225.06	1	225.06	4.26	.042
Residual	5069.20	96	52.80		
Total	7372.92	99			

It is evident from the results (Table 5) that F-ratios for two-way interactions (4.26) and for the main effects of the skill (24.73) and motivation (14.63) are statistically significant. This means that skill and motivation individually produce significant difference in performance as well as they interact significantly to make differences in performance of the workers of public sector textile mills.

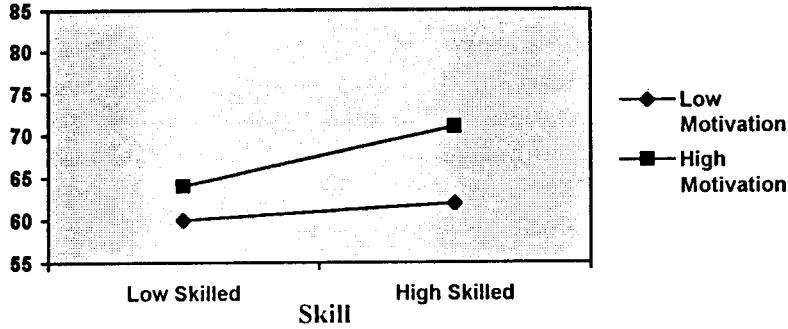
Table 6

Cell Means (Including Rows and Columns) for the ANOVA Presented in Table 5

	Low-skilled *M*	High-skilled *M*	Total *M*
Low Motivated	60.20 (16)*	63.35 (19)	61.91 (35)
High Motivated	62.80 (35)	72.26 (30)	67.17 (65)
Total (*n*)	61.99 (51)	68.80 (49)	65.33 (100)

*Values within parenthesis represent sample size.

Figure 3



Interaction Effects of Skill (Low-High) and Motivation (Low-High) on Performance of the Workers of Public Sector

Figure 3 plots the cell means shown in Table 6. Levels of skill (low-high) are shown on the X-axis and the mean performance of the workers is shown on the Y-axis. Figure 3 plots the mean performance of Low-motivated workers corresponding to the two levels of skill (low-high) and joins the points (60.20 and 63.35). The resulting curve is labeled Low-motivation. Figure 3 also plots the performance of High-motivated workers corresponding to the two levels of skill and joins the points (62.80 and 72.26). The resulting curve is labeled High-motivation. It is evident that the two curves are not parallel. The difference in performances between the two motivation conditions (high-low) was significantly greater for high-skilled workers than for low-skilled workers. Thus, motivation has differential effect on performance of the high and low skilled workers. Therefore, it may be concluded that there is a significant interaction effect of motivation and skill on performance of the workers.

Table 7

Difference between the Mean Scores of Motivation of Workers of Private and Public Sector Textile Mills

Workers	*n*	*M*	*SD*	*t*	*df*	*p*
Private	100	41.66	5.11	3.31	198	.001
Public	100	35.12	12.68			

The summarized motivation scores of the workers in private and public sectors (Table 7) indicate a significant difference between the mean scores of the workers' motivation and that the workers of private sector are more motivated than the workers of public sector. The reason behind the higher motivation among the workers of private sector than among the workers of public sector may be that they are getting better recognition for their work. Sharma and Bhaskar (1991) and Hoque (1996) reported that 'recognition and appreciation' were found to be the weak spots of the public sector undertakings studied. Moreover, Vasudeva and Pal (1988) found that sincere and hard work was more amply rewarded in the private sector compared to the public sector.

The results (Table 1, Table 3, and Table 5) of the present study reveal that there are significant main effects of skill and motivation on performance of the workers. The results further show that skill and motivation interacted significantly to make differences in the performance of the subjects. This means that skill and motivation individually as well as jointly affected performance of the workers in the textile mills. The results imply that the effect of motivation on performance is dependent on the level of skill of the workers, and the relationship of skill to performance is dependent on the level of motivation of the workers in both the sectors. The results are consistent with the findings of the studies carried out by Fleishman (1958), French (1957), Locke et al. (1978), Vroom (1960), and Wyatt (1934). The results (Table 3, Table 5, Figure 2 and Figure 3) further show that the interaction effects of motivation and skill on performance of the workers is more dramatic in the private sector than the public sector. This may be due to the fact that the workers of private sector have significantly higher motivation than the workers of public sector (Table 7).

CONCLUSIONS

The following major conclusions emerged from the study:

1. Skill and motivation have significant main effects and interaction effects on performance of the workers.
2. The interaction effects of motivation and skill on performance of the workers is more dramatic in the private sector than that in the public sector.
3. Workers of private sector textile mills are significantly better than their counterparts in the public sector in terms of their motivation level.

IMPLICATIONS

The above findings may have considerable implications for managerial practices.

The findings suggest that managerial efforts to obtain and develop persons with skill and ability and to motivate them must proceed concurrently. Management should take necessary steps simultaneously to improve both skills and motivation level of the workers. There should be adequate training facilities so that the workers can achieve required skills. But both sectors lack specialized training programs for the workers. Only 3% and 4% of the sample of workers in the private and public sectors, respectively, had special training for a period ranging from 3 to 7 days. Thus, management should assess training needs of the workers and arrange training program for them accordingly.

On the other hand, if the workers who have the required abilities and have best training, still their production may not be high if they are not properly motivated. So, adequate incentive systems both financial and non-financial should be introduced to improve motivation of the workers. Management should also adopt scientific procedures to select skilled workers possessing positive attitudes towards their jobs. Indifference to or negligence of any one of the two (motivation and skills) will hamper performance of the workers.

The growth of public sector in Bangladesh is a matter of necessity for the development of our economy in which both public and private sectors would play their important roles. Management of public sector textile mills should recognize and appreciate individual differences in performance and reward them based on their performance. If the Government is to make the public sector productive and profitable, then new and technical changes will have to be made in the area of the public sector.

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