A Study on the Effects of Job Rotation on Body Discomfort, Employee Productivity and Job Satisfaction on Selected Garment Companies

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Abstract

This study is about the effect of job rotation on employee productivity and satisfaction on selected garment companies in the Philippines. Questionnaires such as Cornell Musculoskeletal Discomfort Questionnaire (CMDQ) and Minnesota Satisfaction Questionnaire (MSQ) were distributed to the sewers of two companies to determine the muscular discomfort and satisfaction they feel towards the rotational job versus non-rotational job. Production rates of the respondents were also obtained to serve as basis on how they perform their tasks. Same set of questionnaires were given to the workers after job rotation was implemented. After which, the production rates were recorded again to be able to compare that with the previous setup. To determine the effect of job rotation on employee productivity and satisfaction, the analysis of variance was used. The results showed that the application of job rotation is generally beneficial to both garments companies. However, the demographics of the works must be taken into consideration. For both companies, same result was obtained: discomfort is directly proportional with age. Same conclusion goes with job tenure; it is directly proportional with MSD. On the other hand, when job rotation was implemented, the discomfort of the sewers decreased as compared to the discomfort they experienced during a non-rotational job.

Keywords
job rotation, musculoskeletal discomfort, employee productivity, job satisfaction

1. Introduction

Job rotation is defined as a job design technique in which employees are moved between two or more jobs in a planned manner. The objective is to expose the employees to different experiences and wider variety of skills to enhance job satisfaction and to cross-train them. Job rotation moves workers between different jobs or tasks whereas job enlargement increases the number and variety of tasks within a job. The premise of job rotation is that alternating tasks between muscle groups will provide rest periods and reduce overall muscle activity thus reducing muscular overload (Mathiassen, 2006). However, the effectiveness of job rotation as a means to reduce the incidence of musculoskeletal disorders in the workplace remains inconclusive, with demonstrated benefits being very specific to the tasks investigated (Keir, et al. 2010).

According to studies, the job rotation's central aim is to increase empowerment of the employees, enhance their skills, arranging appropriate incentives, inventing ways to keep them motivated and eventually create a powerful, dedicated workforce that would keep on matching with organizational, market and social requirements (Appelbaum et al., 2000; Gollan, 2005; Lawler, 2005; Boxall & Macky, 2007).

The principle of job rotation is to alleviate physical fatigue and stress of a set of muscles and tendons by rotating employees among other jobs that use different muscle-tendon groups. The tasks over which job rotation, multi-tasking, and learning occur are here interpreted in a wide sense. They cover not only formal occupational functions, but also the exercise of social skills, communication with fellow employees and customers, collaborative skills, judgment, initiative, and creativity.

However, according to OSHA Guidelines (1993), job rotation should be used with caution and as a preventive measure, not as a response to symptoms.

While satisfaction is closely linked with motivation, the employee motivation argument is that job rotation helps make work more interesting. This argument was mentioned in the late 1970s literature on the so-called "plateaued" employees—employees with limited promotion prospects. Job rotation motivates employees who would otherwise become bored and tired of always performing the same tasks. In principle, these practices can complement job rotation in two different ways. One possibility is that, independently of the reasons that lead a firm to introduce rotation (learning or motivation); these practices reduce the costs of adoption. For example, it is easier to implement job rotation when employees are already used to working in teams onto interacting with other employees through quality circles. Another possibility is that these practices are complementary with rotation only insofar as they serve the same purpose as job rotation (learning or motivation) (Eriksson & Ortega, 2006).

1.1. Objectives

The researchers wanted to determine and assess the effects of job rotation on employee productivity and satisfaction in selected garments companies in the Philippines. A working scheme was developed using job rotation to determine the effect of musculoskeletal discomfort and exposure to tasks involving repetitive or sustained postures, movements and repetitiveness on employee productivity and to develop employee's abilities and learning strategies that will increase efficiency, and increase employee satisfaction as well for the employees to be motivated.

2. Literature Review

A study by Michalos, et al (2010) studied the dynamic job rotation for workload balancing in human based assembly systems of an automotive assembly line. The study determined the design of the job rotation by using considering predefined rotation criteria like competence, operators fatigue accumulation, distance travelled, cost, repetitiveness of tasks, and determining the rotation schedule and task assignment using hierarchical model. As a result, the proposed model can be used for determining a good solution to the operators' scheduling problem. However, computational requirements introduce a constraint. The application of more constraints (e.g. ergonomic evaluation, etc.) can help limit the solution search space.

Menzel (2001) conducted a study on manual handling workload and musculoskeletal discomfort in nursing personnel. Majority of the sample was drawn from those working in the permanent day/evening shift rotation. Cornell Musculoskeletal Discomfort Questionnaires (CMDQs) were used to assess the discomfort of the nurses. Multiple regression analysis indicated that the number of high risk patient handling and movement tasks performed per hour, the number of patients cared for who weighed 212 pounds or more, and the interaction of the two were associated with the frequency of knee and wrist pain, but not with low back pain. The following variables were not associated with the frequency of musculoskeletal discomfort in anybody part: patient census/able bodied staff ratio, patient classification rating, or number or use of patient handling and movement equipment. Manual handling workload did differ significantly among job categories, with registered nurses performing the fewest at-risk patient handling tasks and nursing aides the most.

The study of Feinstein (2000) focused on the relationships between job satisfaction and organizational commitment among restaurant employees. The organizational commitment questions were adopted from the validated Minnesota Job Satisfaction and Organizational Commitment Questionnaires. The study indicates that tenure had a significant (α=0.05) effect on several of the component scores for satisfaction; store location had a significant effect on the level of satisfaction with policies; and the level of education significantly affected satisfaction with recognition. Further, satisfaction with policies, compensation, work conditions, and advancement were found to have a significant relationship to organizational commitment.

As far as the studies found by the researchers are concerned, there has been a little, if not none, information on a study that focuses on implementing job rotation in the Philippines. Based from a news article (CCC, 2001) the workers of IGMC protested after implementing job rotation because there had been an issue regarding their wage. In addition to this, Tuano (2002) concluded that job rotation was employed as an effect of Asian financial crisis on the Philippines labor markets. However, in a case study from the book ―Work Organization and Ergonomics, the job rotation in a

factory producing plastic goods in the Philippines was welcomed by the workers as they no longer risked long turns on disagreeable jobs. Relations between the workers also improved. The new scheme apparently had favorable effects on the workers' morale. Moreover, job rotation has been included in the career and personnel development stated in the Republic Act No. 9432 which shall be known as Magna Carta for Public Social Workers.

3. Methodology

3.1. Conceptual Framework

The study proper focused on the comparison between the results of the evaluation of the non-rotational and rotational job. A two-part data gathering was carried out. Since there were two factors considered, namely employee productivity and satisfaction, these were analyzed both for the non-rotational job and rotational job to be able to compare which of the two jobs is better. To score the discomfort, CMDQ was used. For the job productivity, the employee productivity was measured by determining the average units produced for every shift. The research study is expected to determine the best job rotation schedule for the garments industry. Aside from this, a job rotation design was created considering the employee productivity satisfaction as shown in Figure 1.

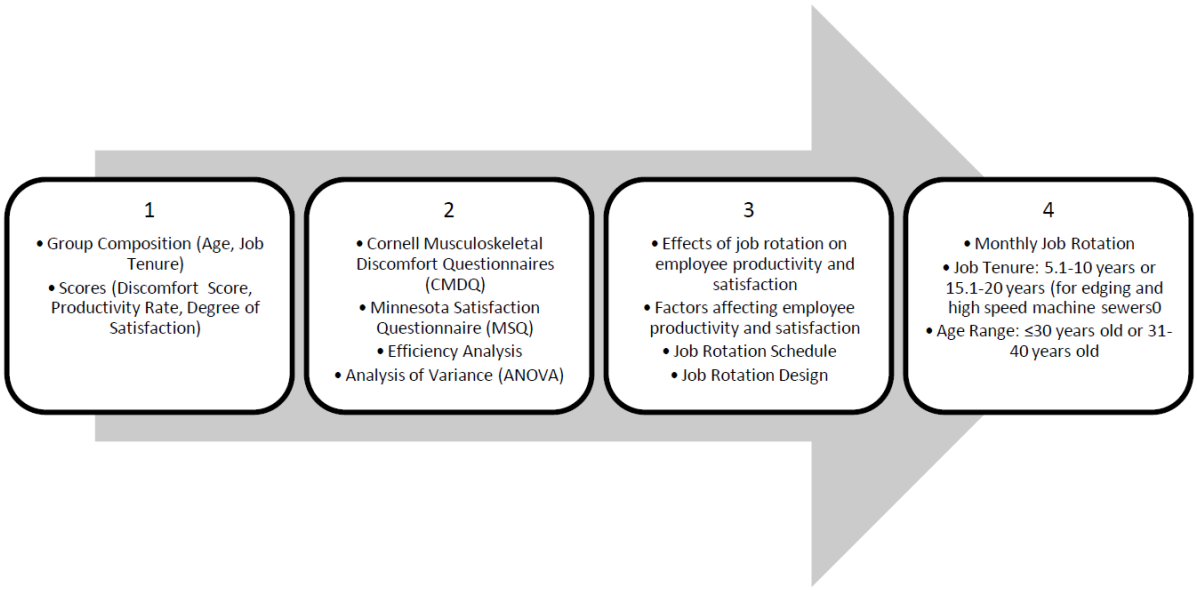

Figure 1. Conceptual Framework

3.2. Research Design

The research study had used an experimental research design. This research is both qualitative and quantitative approach that used descriptive methods to explain the data gathered and eventually determined the importance of the results that were obtained. The actual job rotation was the focus of the experiment. This was conducted to be able to acquire the response of the workers on musculoskeletal discomfort, performance, and satisfaction and therefore plan for a job redesign.

3.3. Respondents of the study

The data used in the analysis was obtained from Luna San Trading and Manxon Garments. There were 60 respondents of the study which consist of both male and female sewers.

3.4. Instrumentation

Two types of Cornell Musculoskeletal Discomfort Questionnaires (CMDQ) by Hedge (1999) was used, the one for the worker's body and the other is for the hand symptoms. These were used depending on the nature of work. These two types also have distinct questionnaire for males and for females.

The questionnaires were given at the beginning of the experiment wherein the first set of CMDQ were answered based on the experiences during the non-rotational job and next set during rotational job. The obtained scores from the two

sets of questionnaire were subjected for Analysis of Variance (ANOVA) to determine whether the discomfort scores differ in two types of job scheme.

3.5. Productivity Analysis

The productivity level was determined by computing the number of units finished per unit time using the formula below.

$$Actual\ Productivity_{(actual)} = \frac{units\ produced}{unit\ time} \quad (1)$$

For this equation, the unit time is on a weekly basis. This served as the score for the performance of the worker. Like the previous process, the productivity rate was used for the non-rotational and rotational job. The productivity on the non-rotational job was compared to that of the result of the productivity when job rotation is applied. The results for each job was tested using ANOVA to find out if there is a significant difference between the means of the computed productivity obtained.

3.6. Job Satisfaction Analysis

Like the previous analyses, the job satisfaction analysis was administered using the Minnesota Satisfaction Questionnaire (MSQ) short form version (1977). The mean scores of job satisfaction on non-rotational and rotational job were also compared using ANOVA.

3.7. Data Gathering Procedure

The sampling was categorized by age, and job tenure. From the respondents' profile used by Lahai, et al (2004), the sampling table are grouped on Table 1.

Table 1. Sampling Table for Demographic

Data of Respondents	
Age Range	Job Tenure
≤ 30	1 – 5
	5.1 – 10
	10.1 – 15
	15.1 – 20
31 – 40	1 – 5
	5.1 – 10
	10.1 – 15
	15.1 – 20
> 40	1 – 5
	5.1 – 10
	10.1 – 15
	15.1 – 20

Potential participants for this study were assessed by the researchers according to specific set of qualifications. The garments company should have different sewers using high speed machine and also different sewers using edging machine. In addition to this, it should have not practiced job rotation yet. After the observation, employee profiling will be the next step. This will be done in order to determine the sample that will be used for the job rotation according to the respondents' profile used by Lahai, et al (2004) from the study entitled "Relationship between the Individual Facets of Job, Job Satisfaction and Organizational Commitment."

After gathering all necessary information, the data were used for Analysis of Variance (ANOVA). This determined if the productivity on non-rotational job and that of productivity on rotational job has significant difference or none. Aside from the productivity, the response from the musculoskeletal discomfort were compared using ANOVA as well. The research study was expected to determine the best job rotation schedule for the garments industry. Aside from this, a job rotation design was created considering the employee productivity and satisfaction.

3.8. Statistical Treatment of Data

Analysis of Variance was the main tool to determine if there is a significant difference between the means of the two types of job. The data obtained was analyzed through a Factorial ANOVA. This determined if age range, job tenure, and/or musculoskeletal discomfort score affect the productivity rate and job satisfaction when job setup is changed from non-rotational to rotational scheme.

4. Results and Discussion

Below is the summary of the results from analyses of variance made for both Luna San and Manxon Garments. As can be seen on Table 2, the main effects of the factors to musculoskeletal discomfort, satisfaction, and productivity for both companies are the same. However, there were slight differences between the results obtained for the interactions (simple effects).

Table 2. Summary of Significant Factors from ANOVA

Factors	Interpretation					
	Musculoskeletal Discomfort		Satisfaction		Productivity	
	Luna San	Manxon Garments	Luna San	Manxon Garments	Luna San	Manxon Garments
Job Tenure (A)	Significant	Significant	Not Significant	Not Significant	Significant	Significant
Setup (B)	Significant	Significant	Significant	Significant	Significant	Significant
Age (C)	Significant	Significant	Not Significant	Not Significant	Significant	Significant
AB	Significant	Not Significant	Not Significant	Not Significant	Not Significant	Not Significant
AC	Not Significant	Not Significant	Not Significant	Not Significant	Not Significant	Not Significant
BC	Significant	Not Significant	Not Significant	Not Significant	Not Significant	Not Significant
ABC	Significant	Not Significant	Not Significant	Not Significant	Significant	Significant

Shown on Table 2 is the results from analysis of variance obtained from 60 respondents from the two select garments company. Based on the results, for the musculoskeletal discomfort, factors that have significant difference are job tenure, work setup which is the traditional versus rotational and age. For the satisfaction score, only factor that has significant difference is work setup. And for the productivity score, factors that have significant difference are job tenure, work setup and age.

Table 3. Summary of Effects of Job Factors

Factors		Effects		
		CMDQ	Satisfaction	Productivity
Job Tenure	1 – 5	Low	-	Low
	5.1 – 10	Moderate		Moderate
	10.1 – 15	High		High
	15.1 – 20	Very High		Very High
Setup	Without rotation	High	Low	Low
	With rotation	Low	High	High
Age	≤ 30	Low	-	Moderate
	31 – 40	Moderate		High
	> 40	High		Low

Further analysis had showed how factors are affected by musculoskeletal discomfort, satisfaction and productivity as shown on Table 3. The dash (-) represents the parameters that have no significant effect with corresponding factors. The results have proved that for discomfort scores, workers who have job tenure between 1 to 5 years have lowest discomfort scores while workers who are working between 15-20 years have highest discomfort scores. For work

setup, workers in traditional setup which is not rotational have higher discomfort than workers in rotational setup. For the age, workers aging 30 and below has lowest discomfort while workers who are beyond 40 years old have the highest discomfort. For the satisfaction score, workers working in rotational setup are more satisfied than workers in non-rotational setup. And finally for the productivity, workers working between 1-5 years have lowest productivity while workers working 15-20 years have the highest productivity. For work setup, workers in rotational setup have higher productivity than workers in non-rotational setup. And for the age, workers aging 40 years and above have lowest productivity while workers aging between 31-40 have highest productivity.

Table 4. Summary of Affected Factors

Sewers	Job Tenure	CMDQ		Productivity			Satisfaction
		≤ 30	31 – 40	≤ 30	31 – 40	> 40	31 – 40
Edging	5.1 – 10	✓					
	10.1 – 15						✓
	15.1 – 20			✓	✓		
High Speed	5.1 – 10		✓				
	10.1 – 15					✓	✓

In summary, the Table 4 had showed that sewers who are in the age range of ≤ 30 and have been working for 5.1-10 years projected the lowest MSD when rotated. On the other hand, if productivity is to be considered, sewers who are in the age range of ≤30 and 31-40 and have been working for 15.1-20 years showed to have the highest productivity rate when rotated. Sewers who are in the age range of 31-40 and who have been working for 10.1-15 years have the highest satisfaction rate when rotation was implemented. These are true for sewers using edging machine.

As for the sewers using high speed machine, workers who are in the age range of 31- 40 and have been working for 5.1-10 years projected the lowest MSD when rotated. On the other hand, if productivity is to be considered, sewers who are in the age range of >40 and have been working for 15.1-20 years showed to have the highest productivity rate when rotated. Sewers who are in the age range of 31-40 and who have been working for 15.1-20 years have the highest satisfaction rate when rotation was implemented.

4.1. Job Rotation Design

From the results presented above, it is recommended that sewers (using edging machine) who are qualified for rotation must be rotated on a weekly basis in order to achieve lower MSD, higher productivity and more satisfied workers. For sewers who are using high speed machine, those who are recommended for rotation may be rotated on a monthly basis to achieve lower MSD, higher productivity and more satisfied workers.

However, if we are going to look into the perspective of implementing job rotation in the whole company, it is best to do it on a monthly basis. The Table 5 merely reflects which job rotation schedule a sewer engaged in a specific task (high speed or edging machine) is best considering the musculoskeletal discomfort, productivity, and satisfaction. It is up to the company which way it will look into, individual or a whole.

Table 5. Job Rotation Schedule

Sewers	MSD	Productivity	Satisfaction
Edging	Weekly		
High Speed	Monthly		

5. Conclusion

Based from the results obtained, the following points were deduced from the study, first, the musculoskeletal discomfort experienced by workers is affected by their age, job tenure and the setup of their work. It is noticeable that if the sewer is younger, he/she experiences lesser discomfort than those who are older. For both companies, same result was obtained: discomfort is directly proportional with age. Same conclusion goes with job tenure; it is directly proportional with MSD. On the other hand, when job rotation was implemented, the discomfort of the sewers

decreased as compared to the discomfort they experienced during a setup without rotation. Second, the satisfaction of the workers does not rely on how old they are or how long they have already been working. It simply relies on the working setup they are engaged with. The researchers conclude that this study can justify one of the objectives of job rotation which is to uplift employee satisfaction. The satisfaction of the workers towards their job increased when the researchers applied job rotation, making their usual line of work become more challenging as they try to cope with changes in their operations. And last, older sewers tend to have lower productivity than younger ones. This may be because they cannot work as fast as younger workers do because of old age. However, based from the results, middle aged sewers are more productive than younger ones. This may be because they are more familiar with the job than them. And unlike the older ones, they can still work fast since they are not that old. In addition to this, sewers appeared to be more productive during the application of job rotation.

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