

## Influence of Singing Dancing During a Rest Break Towards Productivity and Product Quality

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**Abstract:** The *Pencantingan* of *Batik* process includes physic and mental task, art as well as creativity, in order to increase Productivity and Product Quality requires a touch of relaxation. Singing Dancing is a new treatment combine from elements Biodanza and Choir singing to solve that issue. The purpose of this research was to examine the influence of Singing Dancing (jig while singing) during a rest break toward Productivity and Product Quality in the *Pencantingan* of process of *Batik*. To achieve that goal, this research involves sixteen female participants of *Batik* in the area of Malang-East Java-Indonesia with the characteristics of demographic consist of: age: 24.44±0.79 years; height: 152.25±1.27 cm; weight: 44.00±1.13 kg; Body Mass Index (BMI): 19.00±0.48 (m/kg<sup>2</sup>); the experience of making *Batik*: 3.63±0.68 years. Research strategies include: a control condition without rest break ; experimental conditions include stretching and Singing Dancing for ten minutes (5 minutes for each stretching and Singing Dancing; 5 minutes rest for both treatment) held twice a day before noon and the afternoon; *Batik* motives: *Buketan* and *Kawung*; amplitude of music: medium (70 db); beat: dynamic/joyous; music: *dangdut*. The measurement of Productivity obtained from the cycle time measured using stopwatch and the Product Quality measured using sigma level. Data processing using ANOVA and regression analysis, results of the research found significantly Singing Dancing provide a positive influence and greater on the Productivity and quality of the products than without rest breaks and stretching. The Productivity of Singing Dancing for both motives increased to by 13.33% to the *Buketan* motives and of 9% to the *Kawung* motives be compared to the stretching. Product Quality also experiences an increased to the Singing dancing of 3% to the *Buketan* motives and to by 2.2% to the *Kawung* motives with respect to stretching.

**Keywords:** Rest break • Stretching • Singing Dancing • Cycle time • Sigma level • *Batik*

### INTRODUCTION

*Batik* ( wax-resist dyeing ) constitutes the materials cloth for garments, in the production process is not merely a job making *Batik*, but the art of describing expression individual creativity and inner the workers, every shred *Batik* have diversity of *Batik* motives filled

aesthetic of value and the philosophy of deep [1], in a *Batik* containing ornament and *isen-isen*, grouped into 2 groups motives namely motives geometric for example: *Kawung*, *ceplok*, *parang* and motives non geometric for example: *Buketan*, *lung-lungan*, *semanan* [2, 3]. Stages of the production process of *Batik* covering 4 stage i.e. process of making pattern, *Pencantingan*, *pewarnaan*

(dip the cloth in the water that had been given color after the process of *nembok*) and *pelorotan* (remove the wax with dipped on hot water after tinting process) [4]; along with growing demand, the *Batik* experiencing shift, especially on the process of *Pencantingan* originally done by ladies at home as additional income independently stated time loose, at present the *Batik* being in the form Small Medium Enterprises (SME) / company (manufacturers), in this research would focus on production form SME and only on the process of *Pencantingan*. The process of *Pencantingan* is a process traced liquid wax to a surface cloth covering activities: *klowong* (Traced liquid wax according to a pattern), *isen-isen* (put the liquid wax on the inside of the pattern with a specific image after the process of *klowong*), *nerusi* (Traced liquid wax in two surfaces the cloth according to a pattern) and *nembok* (Cover the subject with wax liquid so as to remain white at the time of tinting done after the process of *klowong*), done manually use the hands by holding canting liquid containing wax extracted from a hot pan, then the beak *canting* scratched on a cloth white size (105-106) cm x (225-265) cm are patterned and without pattern, *Pencantingan* done repeatedly until all the pattern is completed (covered with wax) [2, 4].

Ergonomics factors which can result in the risk of the development of Cumulative Trauma Disorder (CTDs) are grouped into 3 factors include: Working Condition (Physical, Repetition, Force, Awkward posture, Contact stress, Vibration, Temperature extreme), Work Organization (Stressful conditions) and Personal issue (Off-the-job activities, Physical condition, other diseases) [5]. Most outstanding ergonomic risk on *pencantingan* process if observed lies with the work condition factor for awkward posture (e.g. the position of the right hand and forearm hanging Form the angle of  $< 90^\circ$ , positioning the stomach distress because the foot bent to form corners  $< 90^\circ$ ) and repetition (for example: at the time of taking the liquid wax with canting to the right body position leaning a bit and swirls around  $30^\circ$ , this is done over and over again revolves around every 10-20 seconds), Results of the survey of body parts that are complaining about is parts: neck, a back the loin and leg, if this last long and does not give to rest break, then can cause the risk CTDs as tendonitis [5, 6]. Granting rest break or rest period is to recover the muscle not to fatigue and strains [7]. Some research pertaining to rest break [8] conducted to recovery of physiological stress and biomechanical loading. Frame work rest schedule [9] to physical workload in the back and legs of due to a standing work.

Micro break [10] musculoskeletal pertain to the problem visual fatigue and stress job. Frequent a short rest break [11] to improve production rate discomfort rating and stress ratings. A short break [12] with Frequent often and long break Frequent rarely, measured is hearten rate perceived/tension exertion and feeling of fatigue. Rest break committed by some researchers still focused on effort determination framework rest schedule to make recommendations rest break and are focused on the issues of physical. The granting of rest break alone was still not enough, there are still other issues related to muscle flexibility and Range of Motion (ROM) so that emerge the idea of incorporating stretching during rest breaks. Stretching aims to enhance perform, reduce injury, developing flexibility and alleviating muscular soreness [13]. Stretching at work station [14] muscle strain prevention efforts through improve flexibility. Exercise program short term ( $< 10$  days) [15] measured Body Part Discomfort Scale (BPDS) and In-Chair movement (ICM) to degrade postural musculoskeletal discomfort and immobility. Stretching and joint mobilization exercise [16] is to reduce musculoskeletal discomfort and fatigue level. Interventions rest break, stretching and exercise of the above research also focused on efforts to resolve the question of the physical and the type of work the majority of physical tasks, what about the mental task?.

The problem is getting to develop not only to overcome the problem of physical, but moving at psychology relating to a type of jobs not limited only to physical task but also on mental task, including the element of the arts and creativity needed for example, needs so that the mediation of psychology that is concerned with the problem of relaxation, the mood, arousal, emotion and feeling recovery. Mediation psychology done by giving intervention music while working, style categories of music by the use of personal stereo and headsets pertaining to affect or state positive mood and quality of work on the job software design [17] [18]. Variations of amplitude to the relaxation response, softer music (60-70 dB) support for the purpose of relaxation [19]. Aromatherapy massage and music lowered the occupational stress and anxiety levels [20]. Effects of Choir Singing or Listening conducted to measurements of the effect on the Secretion of Immunoglobulin A (S-IgA) which is a description of the Emotional State of choir singing with listening [21]. Psycho-Immunological Process on Evaluation of Biodanza [22] measurements of the effect is on the Secretion of Immunoglobulin (S-IgA) and feeling of relaxation between Biodanza with Yoga. On two recent research Biodanza and Choir Singing is an

inspiration in this research as a new treatment on a workstation, because emotional state on Biodanza is better than Yoga and emotional state Choir Singing is also better compared to listening, by way of combining elements of Biodanza as elements of motion and Choir Singing as singing called the treatment of the Singing Dancing in a format jig while singing. Furthermore this type of a *Batik* work requires a touch of relaxation because it contains elements of mental tasks, art and creativity as well as not only on a physical task, therefore in this research will be focused on the treatment of the Singing Dancing by limiting measurements on Productivity and Product Quality. The type of music used in Singing Dancing is a *dangdut*, the music is a lot of interest of society Indonesia, where if hear music *dangdut* will a jig or sway by itself, do free movement of feet, hand and body, not just as in the cha-cha, salsa, the samba or line dancing other having many rules in perform a movement [23] [24]. This research aims to test the influence of Singing Dancing toward Productivity and Product Quality.

### MATERIALS AND METHODS

**Subjects:** Subject or participants is *Batik* maker who worked on small and medium enterprises existing area Malang-East Java-Indonesia, of results of the survey was four SME would have employees around 5-20 the workers of *Batik*, in this taken one SME with 16 the workers of *Batik* (the agreement with SME). 16 the workers of *Batik* chosen is the workers not having impaired health: hypertension, heart disease, diabetes. The characteristics of demographic consist of: age: 24.44±0.79 years; height: 152.25±1.27 cm; weight: 44.00±1.13 kg.; Body Mass Index (BMI): 19±0.48 (m/kg<sup>2</sup>); experience: 3.63±0.68 years.

#### Material

**Pencantingan Equipment:** Consisting of: Several kinds of *canting* to *klowong*, *isen-isen* and *nembok* used to traced wax liquid to surface cloth; *gawangan* used to spread and hang cloth when the process of *Pencantingan*; a chair used to seating at the process of *Pencantingan*; a stove used to heat the wax; a skillet as sconce liquid; wax is material paraffin, or micro wax or *gondo rukem* or resin or beeswax used for covering to keep white color, in research is using wax from paraffin; white cloth patterned or without patterns ( 105-106 centimeters x 225-265 cm ); ijuk (palm fiber) to open the orifice beak *canting* if clogged [2, 4].

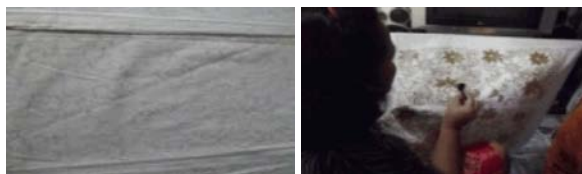


Fig. 1: Motives *Buketan* and white cloth patterned *Buketan*.



Fig. 2: Motives *Kawung* and white cloth without a pattern (only the line).

Table 1: The Total checked each of ornament

Motive	Ornament	P1	P2	P3
<i>Buketan</i>	Flowers	3	8	24
	Butterfly	1	9	9
	Star	1	18	18
	Trunk	1	20	20
	Leaf	1	7	7
<i>Kawung</i>	The Petals of <i>Kawung</i>	26	4	104

P1 : The amount of ornament; P2: The amount checked every ornament; P3: The amount that be checked

**Music Equipment:** Music equipment consists of a set of sound system consists of a TV, DVD and compact disk sound. To the tune of *dangdut* collected in 10 DVDs, each DVD contains 20 songs from 1990-2011, to the singer familiar (e.g.: *Rhoma Irama*, *IkeNurjana*, *Ayu Tingting*, *Meggi Z.*, *Mansyur*, *Dewi Persik*, *Fitri Karlina*, *Saiful Jamil*).

**Cloth:** Cloth for treatment there are two type: patterned (Figure 1) means of white cloth had been given pattern motives certain so that the workers of *Batik* directly conducted to process of *Pencantingan* follow as a pattern a motive that exist and without motive (Figure 2) white cloth have been given a line of course. A measure of white cloth that is used 105 cm x 225 cm, divided into 32 specimens each undersized 25 cm x 25 cm. A motive that used there are two namely *Buketan* motives and *Kawung* motives. A *Buketan* motives, contains 5 species of ornament (Figure 3) consisting of: flowers; trunk; butterfly; star and leaf. The number of ornament for each type of ornament and total were checked every ornament (Table1). The *Kawung* of motives (Figure 4) is containing only the ornament of petals of *Kawung*.

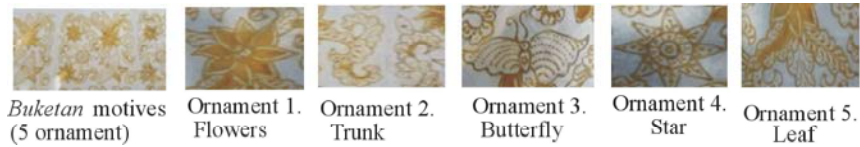


Fig. 3: Five ornaments of a motives *Buketan*

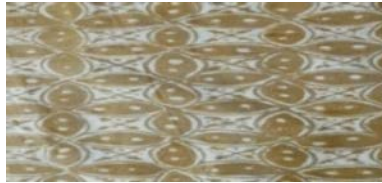


Fig. 4: Kawung motives, and ornament of petals of Kawung



Fig. 5: Cycle Time of *Pencantingan*

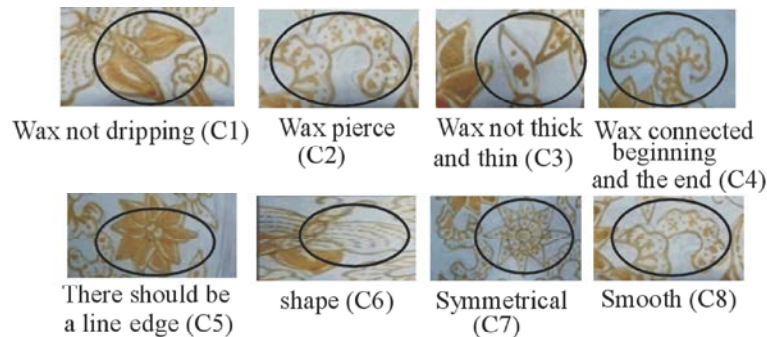


Fig. 6: CTQ motives *Buketan*

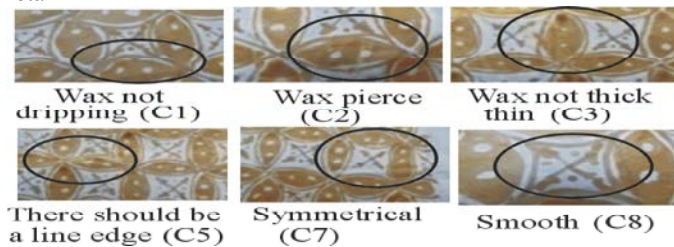


Fig. 7: CTQ motive *Kawung*

**Measuring Instrument:** Measuring instrument for measuring Productivity based on cycle time/specimens units, is cumulative of the cycle time of *Pencantingan* (Figure 5) by repeated (taking wax liquid, blowing beak canting, traced wax to cloth, again took wax liquid) to produce 1 unit specimens by using stopwatch [25]. To measure the quality of the product using the sigma level [26, 27] is based on the value of critical to quality (CTQ) and the number of defects, then converted to the number of defects per million opportunities (DPMO). CTQ obtained from the results of the survey and interview some experts *Batik* (*Andis Batik*

*east Sumbermanjing-Malang; Batik Erna Mojokerto; Raden Wijaya Batik Batu-Malang*) explains that the quality of the *Pencantingan* include: 1. Wax not dripping; 2. Wax pierce; 3. Wax not thick and thin; 4. Wax connected beginning and the end; 5. There should be a line edge; 6. Shaped; 7. Symmetrical; 8. Smooth. On this research CTQ for any *Buketan* motives (Figure 6), CTQ divided according to each ornament (Table 2) includes: CTQ flowers = 6, butterfly = 6, star = 6, trunk = 6 and leaf = 6. For any *Kawung* motives (Figure 7) and see the Table 2. ornament only one: the petals of *Kawung* with CTQ = 6.

Table 2: CTQ the ornament of motives *Buketan* and *Kawung*

Motives	Ornament	Critical to Quality (CTQ)								Total
		C1	C2	C3	C4	C5	C6	C7	C8	
<i>Buketan</i>	Flowers	v	v	v	v	V			v	6
	Butterfly	v	v	v	v	V	v			6
	Star	v	v	v	v		v		v	6
	Trunk	v	v	v	v	V	v			6
	Leaf	v	v	v	v			v	v	6
<i>Kawung</i>	Petals of					V		v	v	6
<i>Kawung</i>		v	v	v				v	v	6

C1: Wax not dripping; C2: Wax pierce; C3: Wax not thick and thin; C4: Wax connected beginning and the end

C5: There should be a line edge; C6: shape; C7: Symmetrical; C8: Smooth



Fig. 8: Six movement stretching

**Experiment:** Research Strategies include: without a rest break (control condition); 5 minutes to Stretching refers to Subaru-Izuzu an automotive plant [14], adapted for 5 minutes to stretching and a 5 minute rest every day done 2 times around 10 am and 2 pm. Singing Dancing as well as equal to the stretching that is 5 minutes to Singing Dancing and 5-minute rest every day done 2 times around 10 am and 2 pm. Performed during 6 days (3 treatment; 2 motives of each 1 day); Amplitude of music: medium (70 dB) [19]; Beat: dynamic/joyous; Music: *dangdut* [23], this is confirmed by the results of the initial research, that the kind of music that is sought after by the worker, turned out to be *dangdut* ranks first.

Treatments and measurements of cycle time/specimens unit and Defects per Million Opportunities (DPMO) to work on each of the motives (*Buketan* and *Kawung*), with the number of participants 16 and 21 specimens to each of a motive, prayers and lunch breaks at 12.00-01.00 pm., with working hours start at 07.00 a.m. and 04.00 p.m. Control condition is a condition where the worker is not given a rest break.

Stretching carried out twice a day held at work with a standing position for 5 minutes and 5 minutes rest, Without music while doing six movement stretching include movement to the neck, backs, fingers, hands, waist and feet (Figure 8): flexibility of the neck (1) (2) (3) (4) (5) (6): move your neck to the left and right, to the front and back as well as turning heads to the left and right, for 50 seconds; the flexibility of the back (7) (8) (9) (10): twisting of the hand with bent position from front to back, then vice versa as well as moving to the left and right, for 50 seconds; the hand flexibility (11) (12): the position of hands straight and parallel moved to the front and back and to the left and right, for 50 seconds; the flexibility of the fingers (13) (14) (15) (16): the position of the hand bent in parallel shoulder while the fingers are moved, then left right hand put together while driven front and back, for 50 seconds; the flexibility of the waist (17) (18) (19) (20): position of the hand left and right at the waist then body is moved bend and back upright, this movement is continually repeated over 50 seconds, the flexibility of the foot (21) (22) (23) (24): walking in place, then continued a raised left and right foot with hand alternately, for 50 seconds, so the total 5 minutes to stretching.

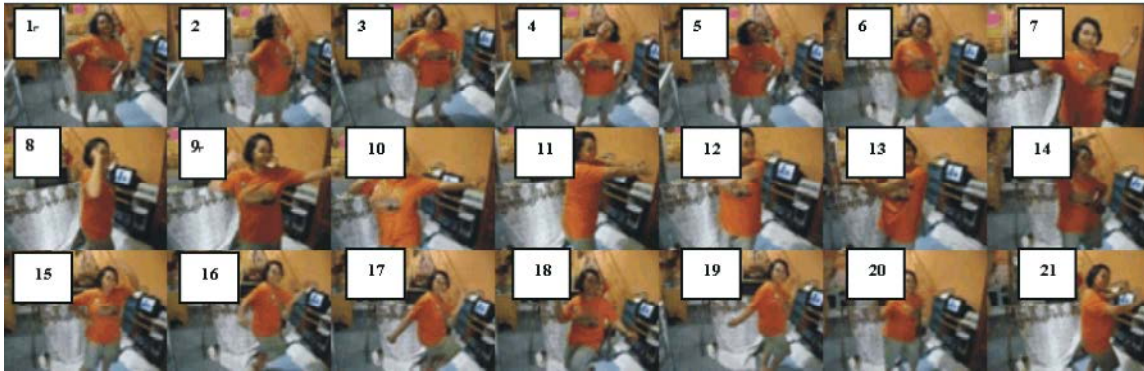


Fig. 9: Singing Dancing (Jig while singing)

Singing Dancing done 2 times during the day, carried out in any place of work while standing at the time of Singing Dancing for 5 minutes and 5 minutes rest, each jig or sways while singing (following the music be heard from the sound system) with the free movement, foot, hand, hip and other members of the body to perform relaxation according to the needs of each (Figure 9): Singing Dancing has elements of flexibility movement of the neck (1) (2) (3) (4) (5) (6); the flexibility of the back (6) (7); the flexibility of the hand (8) (9) (10); the flexibility of the fingers (11) (12) (13); the flexibility of the waist (14) (15); the flexibility of the foot (16) (17) (18) (19) (20) (21), in total for 5 minutes to Singing Dancing.

Each worker carried out the process of *Pencantingan* as much as 21 specimens for each motives (*Buketan* and *Kawung* motives), starting with a *Buketan* motives for control conditions as many as 21 specimens once completed, next day continued with stretching as much as 21 specimens, the next after stretching is completed, the next day continued with the Singing Dancing as much as 21 specimens. The same thing will be done at the next *Kawung* motives.

Measurement of time production / unit specimens or cycle time / unit specimens is summation cyclical time of *Pencantingan* or cycle time to produce one unit of specimens. Cycle time measurement is performed directly at the moment of the process of *Pencantingan* using a stopwatch, until the entire motive and the treatment is complete. The measurement of the amount of faulty results from the process of *Pencantingan* carry out after the process of *Pencantingan* is completed by marking each specimens, Furthermore do the checks and the recording of events that do not fit with the CTQ.

**Data Processing:** Time of produce obtained from direct measurements at the time of the process of *Pencantingan*

according to the motives and treatment for 16 participants, each of the 21 specimens, obtained the data as much as 2016 data production time, then conducted Analysis of Variance (ANOVA) of the General Linear Model (GLM) Univariate-3 factors, i.e. factors motive, the treatment and the participant as a dependent variable and variable factor is the production time/unit specimens, this analysis was carried out to determine the influence of each of these factors and their interaction using MINITAB program V.16., then proceed with the regression analysis to find out the magnitude of the influence of each variable on the dependent variable factor. Further analysis of the data production time of 2016 processed with using Microsoft Office excel 2007, to find out the average time of production and Production capacity/day each motif and then treatment is described in the form of a graph.

The value of Sigma Level is the description of the Product Quality, In this research will be calculated sigma level each motives all participants each treatment, made by using Microsoft Office excel [28]. Table 3 shows how to obtain the value of sigma level each motif each participant each treatment. The value of sigma level per motif per participant per treatment obtained from DPMO value, which the DPMO value is the ratio between the total defect of the whole type of ornament of the 21 specimens divided by total were examined for each specimen of the type of ornament (Table 1) multiplied CTQ (Table 2) and 21 specimens, then the result multiplied by 1,000,000 opportunity. Sigma level each motives all participants each treatment obtained by the same manner with sigma level each motives each participants each the treatment, only totaled it converted, the total to defect obtained from examination 21 specimens and 16 participants, total were checked is multiplication of total were checked for any specimens all kinds of ornament multiplied by 21 specimens and 16 participants.

Table 3: The way to get the value of sigma level each participant each treatment

Motives	Ornament	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)					
<i>Buketan</i>	Flowers	3	8	24	6	21	3							
	Butterfly	1	9	9	6	21	2							
	Star	1	18	18	6	21	5							
	Trunk	1	20	20	6	21	4							
	Leaf	1	7	7	6	21	2							
									78	6	21	16	1,628	4.44
The sigma level of <i>Buketan</i> motives each participant each treatment														4.44
<i>Kawung</i>	The petals of <i>Kawung</i>	26	4	104	6	21	8	610.5	4.73					
The sigma level of <i>Kawung</i> motives each participant each treatment														4.73

(1)= The number of ornament  
 (2) = Part of the observed each type of ornament each specimen  
 (3) = The total examined (1)x(2) ; for every specimens all kinds of ornament  
 (4) = The number of CTQ ;(CTQ = 6)  
 (5) = The number of a specimen of any participant every treatment = 21.  
 (6) = Total defect 21spesimen all ornament, each participant and treatment (e.g.)  
 (7) = DPMO is obtained from the total ((6)/(3)(4)(5))x 1,000,000  
 (8) = Sigma Level for every motive, every participant and each treatment; retrieved from Microsoft Office excel

**RESULTS AND DISCUSSION**

**Productivity:** The result of ANOVA 3 factor see Table 4, known that the value of  $p < 0.05$  for each motives, the treatment, respondents and at that interaction significantly impact on the production time.

On Table 5, the equation of Regression: Time = 14.282 + 4.551 Motive - 2.312 Treatment - 0.036 Participants or  $Y = 14.282 + 4.551 X1 - 2.312 X2 - 0.036 X3$ . It appears that the treatment, motives and variation as

well as the participant gives the effect on production time (cycle time/specimens units). Motives provide the greatest impact to the production time (positive = largest 4.551). The second influence was the treatment of the negative (- 2.312), also the participants has a negative sign (- 0.036). The value of the coefficient of determination of 72% means that 72% of time diversity of *Batik* (Y) influenced by the motives (X1), treatment (X2) and participants (X3). While 28% the rest is influenced by factors other than the research.

Table 4: The result analysis time against motives, treatment and a participant (ANOVA 3 Factor)

Source	SS	df	MSE	F	P
Motive	10,438.401	1	10,438.401	3,417.703	.000
Treatment	7,325.543	2	3,662.772	1,199.251	.000
Participant	146.004	15	9.734	3.187	.000
Motive * Treatment	46.941	2	23.471	7.685	.000
Motive * Participant	164.684	15	10.979	3.595	.000
Treatment * Participant	228.673	30	7.622	2.496	.000
Motive * Treatment * Participant	336.566	30	11.219	3.673	.000
Error	5,864.093	1,920	3.054		
The total	24,550.908	2,015			

S = 1.748 R-Sq = 76.11% R-Sq(adj) = 74.93%

Table 5: The result of regression analysis: Time against treatment, motives and participant

Predictor	Coef	SE Coef	T	P
Constant (C)	14.282	0.181	78.763	0.000
Motive (X1)	4.551	0.082	55.273	0.000
Treatment (X2)	-2.312	0.050	-45.850	0.000
Participant (X3)	-0.036	0.009	-4.033	0.000

S = 1.848 R-Sq = 72.0% R-Sq(adj.) = 72.0%

Table 6: Sigma level each motives each treatment

Motives	Description	Treatment		
		Control	Stretching	Singing dancing
<i>Buketan</i>	*) Mean±Std. Dev.	171±13	114±6	83±4
	Total defect	2,738	1,821	1,331
	Total inspection	157,248	157,248	157,248
	DPMO	17,409.5	11,578.64	8,462.45
	Sigma Level	3.61	3.77	3.89
<i>Kawung</i>	*) Mean±Std. Dev.	318±27	266±32	215±22
	Total defect	5,093	4,270	3,442
	Total inspection	209,664	209,664	209,664
	DPMO	24,291.99	20,363.84	16,416.93
	Sigma Level	3.47	3.55	3.63

\*) The mean of defect

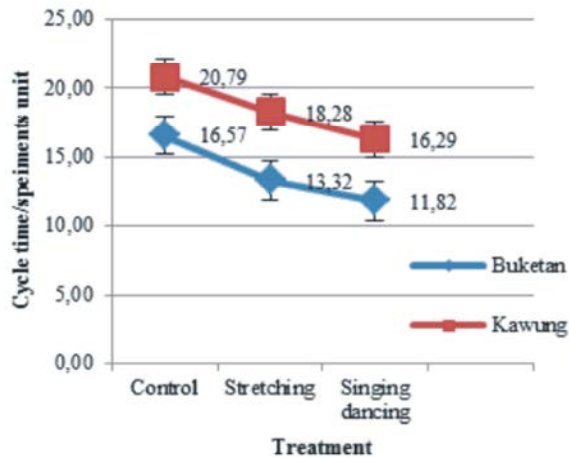


Fig. 10: The average cycle time / specimens unit

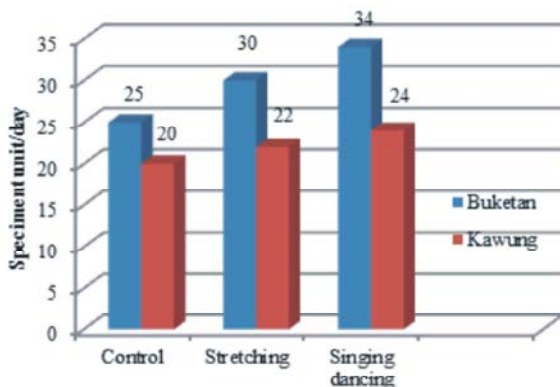


Fig. 11: Production Capacity/day

The average production time/average Cycle Time/Specimens units (Figure 10) *Buketan* motives for the control condition = 16.57 minutes, stretching = 13.32, singing and dancing = 11.82 minutes, production speed increase to by 28.67% toward the controls conditions and

11.26% with respect to the stretching. The control condition of the *Kawung* motives = 20.79 minutes, treatment with the stretching = 18.28 minutes and the Singing Dancing = 16.29 seconds, an increase in the production speed of 21.64% to the controls conditions and 10.88% against the stretching.

Production Capacity/day (Figure 11), the *Buketan* motives for the control condition = 25 units, treatment with the stretching = 30 units and the Singing Dancing = 34 units, That means there is an increase Productivity with the treatment of the Singing Dancing about 36% against the control condition and of 13.33% against the stretching. To the control condition of the *Kawung* motives = 20 units, stretching treatment = 22 units and Singing Dancing = 24 units, an increase in Productivity with the Singing Dancing treatment to by 20% with respect to the control condition and 9% toward the stretching treatment.

**Product Quality:** The total of defect each treatment seem to decline on stretching as well as on the Singing Dancing against a control condition (Table 6), The *Buketan* motives on the treatment of stretching occurs a decrease of 33% against to the control conditions as well as to the Singing Dancing occur a decrease about 27% compared to stretching. On the *Kawung* motives the treatment of stretching occur a decrease of 16% to the control conditions and the Singing Dancing occur a decrease about 19% against to stretching.

Product Quality is measured by using the sigma level (Figure 12) note that the sigma level for the treatment of the Singing Dancing most positive influence than stretching, the sigma level to the control condition of the *Buketan* motives = 3.61, by using stretching sigma level



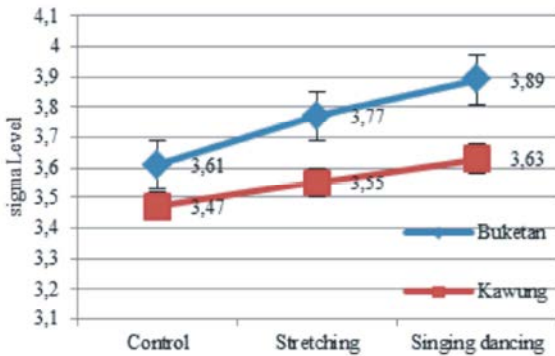


Fig. 12: Sigma Level

be = 3.77, then more positive again its effects with treatment Singing Dancing his sigma level changed to = 3.89, here means there is an increasing quality of products stretching treatment by 4% with respect to the condition of control and a 3% Singing Dancing to stretching. The sigma level to control conditions of the *Kawung* motives about 3.47; the sigma level of stretching = 3.55; the sigma level of Singing Dancing = 3.63, that means there is an increase in Product Quality of the stretching treatment of 2.3% against to the control condition and singing and dancing increased to by 2.2% against to stretching..

The purpose of this research was to examine the influence of Singing Dancing during a rest break toward the Productivity and quality of products on the conditions of control, stretching and Singing Dancing. The results showed that the motif of *Batik*, treatment, participants and their interaction were significant effect on production time. On the regression equation also shows that the type of motif give the greatest impact to the production time (positive = 4,786), production time for *Kawung* settlement longer compared to the *Buketan* motives since it has different levels of difficulty, where the process of *Pencantingan* of the *Kawung* motive more dense, wider process that required higher concentrations. Results of the research found significantly Singing Dancing provide a positive influence and greater on the Productivity and quality of the products than without rest breaks and stretching, the Productivity of Singing Dancing for both motive increased to by 13.33% to the *Buketan* motives and of 9% to the *Kawung* motive be compared to the stretching. Product Quality also experiences an increased to the Singing Dancing of 3% to the *Buketan* motives and to by 2.2% to the *Kawung* motive with respect to stretching.

Stretching, how it will affect the workers, some of the research that supports the hypothesis, stretching aimed to enhance performance, reduce injury, developing

flexibility and alleviating muscular soreness [13, 14] Stretching Programs in the workplace increase the flexibility Profile includes: Sit and Reach; Body Rotation; Shoulder Rotation [15]. Exercise Program at a workstation in short-term can reduce Musculoskeletal Discomfort and Postural Immobility [29]. Short Break in it done Stretching exercise on computer work at the small work site can improve Productivity, eye, leg and foot comfort [16]. Stretching Exercise program to workers/operator's in the call-center of an airline company more efficient than only rest break, reduces the discomfort and fatigue. Referring to some previous research that stretching provides benefits to workers, can reduce the discomfort, fatigue and make your muscles become flexible, prevent muscle strains, leading to endurance in muscle, leading to an increase in Productivity, as in this research treatment using six stretching motions include motions to the neck, backs of hands, fingers, hands, waist and feet aims to provide flexibility in the body of the worker in the process of *Pencantingan*.

Singing Dancing (a jig while singing), what's the difference with stretching, activity Singing Dancing confirmed with Biodanza in outline having a resemblance although forms of intervention different if Singing Dancing stressing: listening to music (*dangdut*); dancing (a jig) while singing; free movement of feet, hand, the hip and other limbs to do relaxation as needed each individual on station ex-coworker; the same profession. On biodanza developed by R.Toro, 1995 [22] comprises 10 session as play exercise simplified if at least includes: listening to music; do physical activity walk and dance while singing done individually or jointly in nature open as well as circle of singing; not in an atmosphere was working; profession work varying; this kind of dance varying; background music also varied; do contact with hands and eyes; the same purpose namely relaxation. After doing the main exercise participants felt the 5 line of experience: vitality, creativity, sexuality and emotionality, transcendence, so as every individual has the power of human integration include: affective psychomotor integration, social integration, as well as [30] man, nature and awareness integration. [22] Conduct to research compare with the Secretary Immunoglobulin A of Biodanza and Yoga. Biodanza results revealed that exert influence is stronger in the long run to changes in S-IgA as compared with Yoga Intervention. Emotional state and emotional stress measurement using Secretary Immunoglobulin A and Cortisol [21] the research was carried out to measure the Effect choir singing or listening results showed that singing lower negative mood, enhances the positive mood

and increased Secretary Immunoglobulin A and has no effect on cortisol, listening on an increase in negative mood, decrease in cortisol and no significant changes in positive mood and S-IgA, with ever increasing S-IgA then increasingly feel relaxes. Interpretation based on previous research above, stretching more leads to flexibility in order to prevent muscle strains so that workers have more power than the control condition. Singing Dancing refers to Biodanza and Choir Singing, not just doing the flexibility as on stretching but by doing Singing Dancing workers could feel more relax, make a reduced sense of stress and workers become more concentration, ultimately could make the better Product Quality, characterized by the reduced number of defect compared to control conditions and stretching.

*Batik* Motives used in this research there are two consist of: the *Buketan* motives and the *Kawung* motives, The *Kawung* have difficulty level than the *Buketan* motive/the Sun because it is more dense so it extents should be done more broadly, the type of work of *Pencantingan* is not only a physical task, but there is also a mental task relating to the placement of the ornament on the background cloth, the size and shape of the target completion, there are also elements of art and creativity must be presented simultaneously at the time to perform the process of *Pencantingan*, therefore the job of *Pencantingan* so can be categorized as a type of work which is quite complicated and challenging. The workers of *Batik* sixteen female having characteristics demographic consist of: age:  $24.44 \pm 0.79$  years; height:  $152.25 \pm 1.27$  cm; weight:  $44.00 \pm 1.13$  kg.; body mass index (BMI):  $19 \pm 0.48$  (m / kg<sup>2</sup>); experience:  $3.63 \pm 0.68$  years, still relatively young, also not fat and experience enough. With the treatment Singing Dancing Productivity could be increase although the process of *Pencantingan* fairly complicated and challenge it is mentioned that the workers getting energetic and not fast tired compared with a control condition and stretching. Previous research that supports [31]. The Effect of Personality Type and Musical Task on Self-Perceived Arousal, measured arousal using Subject Arousal Level: The activation-deactivation adjective check list (ADACL) developed by Thayer, 1978, where the Arousal state including: energy, tiredness, calmness, tension and the Eysenck Personality of Questionnaire developed by Eysenck & Eysenck, 1975, used to identify a participant introvert and extravert, then participants were asked to sing, listen to music, play a keyboard and rhythm tapping. The result of no influence significant between personality type against arousal level; listening to music decrease tension arousal;

singing and rhythm tapping increase energy arousal, lowering tired arousal, also on a keyboard lowering arousal tired. In general the influence music task on personality type and perceived arousal, found it interesting in the music experience for jobs that have a moderate level of difficulty which makes individuals become more energetic and less tired [17]. The Effect of Music listening on Work Performance is an attempt boost state positive affect or mood state and quality-of-work or Productivity using personal headsets or stereo music, the kind of varied shows an indication of the positive influence the quality-of-work, positive impact on mood and perception for doing the work of software design, state and affect positive quality-of-work least without music. Related in this research is the question of the appearance of creativity with the treatment of the Singing Dancing where one of the elemental is to listen to music, it is evident that the process of *Pencantingan* can be done faster it drew up with listening to music be positive stimuli and have an impact on increasing the perception and speed in exploring creativity in the form of ornament and *isen-isen* is needed in a *Batik* motives and also have an impact on the increase of Product Quality.

*Dangdut* music related used in this research, reflecting the character of the type of music that are of interest to the majority of society Indonesia [23, 32]. Effects of Music on Task Performance, the effort done by giving the task to the participants (men and women) to do the placement of the puzzle on the condition: no music, music of choice and dislike the music. The results showed no significant different between men and women or interactions between gender and type of music, participants who listened to the music as they choose can do perform better than no music and no music did perform better than listening to music which is not liked, in General that listen to music gives a positive impact task performance [33]. Research related to coping with Stress: The effectiveness of Different Types of Music, the results show that listening to the selected music or classical music, after exposure to a stressor significantly to reduce the negative emotional state, physiological arousal compared to listening to heavy metal music or sitting in silence. This is in accordance with the research that has been done that type of music that is of interest is the *dangdut*, beat: dynamic/ joyous, so it could have an impact on the performance better, such as Productivity and Product Quality.

The Effect of Music Amplitude on the Relaxation Response [19] to find out the relaxation response by doing changes amplitude variation amplitude: loud (80-90

dB), medium (70-80 dB), soft (60-70 dB) using Continuous Response Digital Interface (CRDI). The results show a tendency of men to prefer loud of music, in general it can be concluded as softer music (60-70 dB) support for the purpose of relaxation. In this research used is the amplitude of the medium (70 dB) so that it is appropriate for the purpose of relaxation so it's not noisy.

### CONCLUSION

Stretching and Singing Dancing provide a positive influence to the Productivity and Product Quality, but Singing Dancing gives greater influence on Productivity and Product Quality compared with stretching, because Singing Dancing can make workers feel more relaxes in the works, along with flexibility, so that a more positive impact on mood and perception as well as endurance.

The future research recommended to continue research with regards to Singing Dancing on the development of experimental design with measurements on Musculoskeletal discomfort, Mental film, physical and muscle fatigue, feeling fatigue (psychophysical strains), feeling stress, Secretary Immunoglobulin A (S-IgA), Cortisol and flexibility in thinking.

### REFERENCES

1. Prasetyo, A., 2010. *Batik Karya Agung Warisan Budaya*. Pura Pustaka, Yogyakarta.
2. Samsi, S.S., 2007. *Teknik dan Ragam Hias Batik*. Balai Besar Penelitian dan Pengembangan Industri Kerajinan dan Batik, Yogyakarta.
3. Susanto, S.S.K., 1980. *Seni Kerajinan Batik Indonesia*. Balai Penelitian dan Kerajinan, Lembaga Penelitian dan Pendidikan Industri, Departemen Perindustrian R.I., Yogyakarta.
4. Setiawati, P., 2004. *Kupas Tuntas Teknik Proses Membatik*. Absolut, Yogyakarta..
5. MacLeod, D., 1995. *The Ergonomics Edge: Improving Safety, Quality and Productivity*. Van Nostrand Reinhold, New York.
6. Zakerian, S.A., M.R. Monazzam, S.F. Dehghan, M.H. Mohraz, H. Hossein Safari and M. Asghari, 2013. Relationship Between Knowledge of Ergonomics and Workplace Conditions with Musculoskeletal Disorders among Nurses: A Questionnaire Survey. *World Applied Sciences Journal*, 24(2): 227-233.
7. Savage, M., and D. Pipkins 2006. The Effect of Rest Periods on Hand Fatigue and Productivity. *Journal of Industrial Technology*, 22(3).
8. Beynon, C., J. Burke, D. Doran and A. Nevill, 2000. Effects of activity-rest schedules on physiological strain and spinal load in hospital-based porters. *J. Ergonomics*, 43(10): 1763-1770.
9. Van dieen, J.H., 1998. Evaluation of work-rest schedules with respect to the effects of postural workload in standing work. *J. Ergonomics*, 41(12): 1832-1844.
10. Balci, R. and F. Aghazadeh, 2003. The effect of work-rest schedules and type of task on the discomfort and performance of VDT users. *J. Ergonomics*, 46(5): 455-465.
11. Dababneh, A.J., N. Swanson and R.L. Shell, 2001. Impact of added rest breaks on the Productivity and well being of workers. *J. Ergonomics*, 44(2): 164-174.
12. Kakarot, N., F. Mueller and C. Bassarak, 2012. Activity-rest schedules in physically demanding work and the variation of responses with age. *J. Ergonomics*, 55(3), 282-294.
13. Bradley, P.S., P.D. Olsen and M.D. Portas, 2007. The Effect Of Static Ballistic and Proprioceptive Neuromuscular Facilitation Stretching On Vertical Jump Performance. *Journal of Strength and Conditioning Research*, 21(1), ProQuest, pg.223.
14. Moore, T.M., 1998. A Workplace Stretching Program: Physiologic and Perception Measurements before and after Participation. *AAOHN Journal*, 46(12): ProQuest Health & Medical Complete pg. 563.
15. Fenety, A. and J.M. Walker, 2002. Short-Term Effects of Workstation Exercises on Musculoskeletal Discomfort and Postural Changes in Seated Video Display Unit Workers. *J. Physical Therapy*, 82(6): 578-589.
16. Lacaze, D.H.C., I.C.N. Sacco, L.E. Rocha, C.A. Bragança and R.A. Pereira Casarotto, 2010. Stretching and joint mobilization exercises reduce call-center operators' musculoskeletal discomfort and fatigue. *Clinics*, 65(7): 657-62.
17. Lesiuk, T., 2005. The effect of music listening on work performance. *Psychology of Music*, 33(2): 173-191.
18. Chiat, L.F. and L.F. Ying, 2013. The Perception of Musical Phrasing in Correlation to Movements in Sports Routines. *World Applied Sciences Journal*, 25(4): 592-599.
19. Staum, M.J. and M. Brotons, 2000. The Effect of Music Amplitude on the Relaxation Response. *Journal Music of Therapy*, 37(1): 22-39.

20. Davis, C., M. Cooke, K. Holzhauser, M. Jones and J. Finucane, 2005. The Effect of Aromatherapy Massage with Music on the Stress and Anxiety Levels of Emergency Nurses. *Australasian Emergency Nursing Journal*, 8: 43-50.
21. Kreutz, G., S. Bongard, S. Rohrmann, V. Hodapp and D. Grebe, 2004. Effects of Choir Singing or Listening on Secretary Immunoglobulin A, Cortisol and Emotional State. *Journal of Behavioral Medicine*, 27: 6.
22. Stuck, M., A. Villegas, K. Bauer, R. Terren, V. Toro and U. Sack, 2009. Psycho-Immunological Process Evaluation of Biodanza. *Journal of Pedagogy And Psychology Signum Temporis*, 2: 1.
23. Weintraub, A.N., 2012. *Dangdut: Musik, Identitas, dan Budaya Indonesia*, Translated in Indonesian language by: Prasetyo A.B. PT Gramedia, Jakarta.
24. Dzhansaitova, S.S. and S.Z. Rauandina, 2013. Music in the World Picture and World Pictures in Music. *World Applied Sciences Journal* 23 (2): 145-150
25. Barnes, R.M., 1980. Motion and Time Research Design and Measurement of Work. Seventh Edition, John Wiley&Sons, Singapore.
26. Gaspersz, V., 2002. Pedomani Implementasi Program Six Sigma, PT. Gramedia Pustaka Utama, Jakarta.
27. Tabari, M., Y.G. Kanani and R.T. Moghaddam, 2012. Application of the Six Sigma Methodology in Adopting the Business Excellence Model for a Service Company - A Case Study. *World Applied Sciences Journal*, 17(8): 1066-1073.
28. Santoso, S., 2007. Total Quality Management (TQM) dan Six Sigma, PT. Elex Media Komputindo Gramedia Group, Jakarta.
29. Henning, R.A., P. Jacques, G.V. Kissel, AB. Sullivan and S.M. Alteras-Webb, 1997. Frequent short rest breaks from computer work: effects on Productivity and well-being at two field sites. *J. Ergonomics*, 40(1): 78-91.
30. Aghdasi, M.T. and M. Nasiri, 2012. Motivations and to Identify its Relationship with Socioeconomic Conditions of Male and Female Participants in Public Exercises in the City of Tabriz. *World Applied Sciences Journal*, 17(1): 109-112.
31. Lim, H.A., 2008. The Effect of Personality Type and Musical Task on Self-Perceived Arousal. *Journal of Music Therapy*, 45(2): ProQuest pg. 147.
32. Young, G., 2003. Effects of Music on Task Performance. Human Factors in QA, QAS 515 Term Paper, Retrieved July 14, 2003 from the World Wide Web: [http://www.essaybank.co.uk/free\\_coursework/862.html](http://www.essaybank.co.uk/free_coursework/862.html) 9, 03/01/2013
33. Labbe', E., N. Schmidt, J. Babin and M. Pharr, 2007. Coping with Stress: The Effectiveness of Different Types of Music. *Appl Psychophysiol Biofeedback*, 32: 163-168.