RINGKASAN

Interaksi Faktor Individu, Mekanisme Peredaman Dan Intensitas Kebisingan Terhadap Ambang pendengaran.

Mardji

Aktifitas industri tidak bisa lepas dari proses mekanik, di mana dari proses mekanik tersebut akan menghasilkan kebisingan, bahkan kebisingan yang terjadi melebihi ambang batas yang diizinkan. Sebagai contoh, data dari sebuah instasi menjelaskan bahwa mesin gerinda dapat membangkitkan tingkat kebisingan dari 80 – 104 dB pada pabrikasi pipa di Virginia Barat. Kemudian dari berbagai investigasi *National Institute for Occupational Safety and Health* (NIOSH) sebagai berikut: mesin pemotong kertas 95–108 dB, perusahaan kimia pada area *cleaning, polishing* 88–113 dB, pabrik gelas 79–92 dB, bengkel manufaktur 115 dB, polisi latihan menembak 157–160 dB.

Dampak dari kebisingan akan mengakibatkan ketulian, hal ini sesuai dengan laporan menyebutkan bahwa masih banyak pekerja yang mengalami ketulian. Data dari sebuah instasi menunjukkan bahwa tahun 1996 sampai 1998 angka kecelakaan kerja 3472 kasus, 82% di antaranya merupakan kasus ketulian akibat kebisingan. Timbulnya ketulian dapat dicegah melalui pengendalian secara tehnik misalnya dengan memberikan peredaman pada sumber kebisingan, pengendalian secara administratif yaitu dengan merotasi job karyawan atau peraturan setiap karyawan diwajibkan menggunakan APT (Alat Pelindung Telinga), namun upaya ini tidak terlepas dari faktor individu yang terdiri dari pendidikan, pengalaman pelatihan dan umur yang menentukan perilaku pemakaian APT dalam mencegah meningkatnya ambang pendengaran, serta umur karyawan yang secara biologis sangat rentan terhadap kebisingan akan menambah ambang pendengaran. Sehingga masalah yang diangkat dalam penelitian ini adalah ambang pendengaran karyawan akibat intensitas kebisingan karena faktor individu.

Program pelatihan keselamatan kerja yang berisikan pencegahan meningkatnya ambang pendengaran mempunyai tujuan utama 1) mengembangkan kesadaran *(awareness)* tentang masalah proses ketulian, 2) mengembangkan metode pencegahan meningkatnya ambang pendengaran akibat bising, 3) mengembangkan sikap menggunakan APT dan 4) mengintegrasikan berbagai pengertian tentang proses ketulian dan penggunaan APT ke dalam struktur norma dan filosofi setiap anggota yang terlibat, program ini biasanya diisi dengan pendidikan dan pelatihan keselamatan kerja, karena pendidikan dan pelatihan dipandang merupakan cara terbaik untuk mengembangkan sikap pencegahan meningkatnya ambang pendengaran.

Seorang karyawan pada waktu menjadi karyawan sudah mempunyai tingkat pendidikan formal tertentu, oleh karena itu sudah mempunyai sikap dasar tertentu pula di dalam bekerja. Ketika karyawan ini mendapat pendidikan dan pelatihan tentang keselamatan kerja, khususnya pencegahan meningkatnya ambang pendengaran maka akan terjadi interaksi antara jenis umur dengan pelatihan; pelatihan dengan pendidikan dan pengalaman di dalam membentuk pencegahan meningkatnya ambang pendengaran. Selanjutnya interaksi juga terjadi antara faktor individu dengan intensitas kebisingan.

Interaksi jenis ini menjadi menarik untuk diungkap karena masing-masing pendidikan mempunyai jenjang. Pendidikan formal mempunyai jenjang SD, SLTP,

dan SLTA, sedangkan pendidikan keselamatan kerja (PKK) mempunyai jenjang "pendek". "medium" dan "panjang periodik" pengalaman mempunyai jenjang "0-9 tahun, 10-20 tahun, 21-30 tahun dan 31-40 tahun" serta umur mempunyai jenjang "21-30 tahun, 31-40 tahun 41-50 tahun dan 51-60 tahun" serta faktor individu yang mempunyai jenjang "lemah, cukup dan kuat", mekanisme peredaman yang mempunyai kategori "1 = 0-5,9; 2 = 6-15; 3 =15,10-26,40 dB" dan intensits kebisingan yang mempunyai jenjang "70–77 dB, 78–85 dB, 86–88 dB, dan 88,10–93 dB".

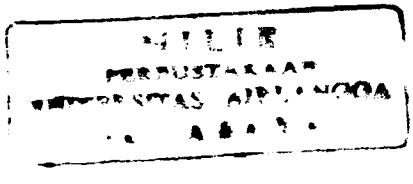
Keunikan interaksi inilah yang diungkap dalam penelitian sehingga pernyataan masalah yang diajukan adalah Apakah ada perbedaan faktor individu yang berupa pendidikan, pengalaman, umur dan pelatihan terhadap ambang pendengaran pada karyawan patal se-Jawa Timur yang terpapar bising? Apakah ada interaksi faktor individu yang berupa pendidikan, pengalaman, umur dan pelatihan terhadap ambang pendengaran pada karyawan patal se-Jawa Timur yang terpapar bising? Apakah ada interaksi faktor individu, mekanisme peredaman dan faktor intensitas kebisingan terhadap ambang pendengaran pada karyawan patal se-Jawa Timur yang terpapar bising? Berapa kontribusi faktor individu (yang berupa pendidikan, pengalaman, umur dan pelatihan), mekanisme peredaman dan intensitas kebisingan terhadap ambang pendengaran karyawan patal se -Jawa Timur?

Manfaat teoritis penelitian ini adalah memberikan analisis ilmiah variabel yang paling dominan dari faktor individu yang berupa pendidikan, pengalaman, umur dan pelatihan dalam mencegah meningkatnya ambang pendengaran. Memberikan analisis ilmiah interaksi faktor individu yang berupa pendidikan, pengalaman, umur dan pelatihan dalam mencegah meningkatnya ambang pendengaran dari karyawan yang terpapar bising. Memberikan analisis ilmiah interaksi faktor individu, faktor intensitas bising dan mekanisme peredaman dalam ketulian dari karyawan yang terpapar bising. Tersusun kontribusi ambang pendengaran akibat interaksi antara faktor individu, mekanisme peredaman dan intensitas bising.

Manfaat praktis adalah masukan pada perusahaan bahwa risiko ketulian akibat kebisingan pada beberapa area pembangkit bising dalam kaitannya dengan faktor individu, sehingga para pemberi keputusan perusahaan dapat menempatkan karyawan sesuai dengan kriteria individu. Pengembangan kebijakan perusahaan berdasar faktor individu, mekanisme peredaman dan intensitas bising dalam memilih dan menempatkan karyawan. Dasar pijakan untuk meminimalisasi terjadinya *hearing loss* di dalam perusahaan, sehingga berdasarkan temuan model kecenderungan peranan pelatihan keselamatan kerja dalam mencegah meningkatnya ambang pendengaran yang menurun seiring dengan kenaikan tingkat umur, dan naik seiring tingginya pendidikan formal maka para pengambil keputusan di industri, patal, depnaker maupun pengelola pendidikan keselamatan kerja agar berhasil guna maksimal.

Hipotesis penelitian ini adalah (a). Ada perbedaan faktor individu yang berupa pendidikan, pengalaman, umur dan pelatihan terhadap ambang pendengaran pada karyawan patal se-Jawa Timur yang terpapar bising. (b). Ada interaksi faktor individu yang berupa pendidikan, pengalaman, umur dan pelatihan terhadap ambang pendengaran pada karyawan patal se-Jawa Timur yang terpapar bising (c). Ada interaksi faktor individu, mekanisme peredaman dan faktor intensitas kebisingan terhadap ambang pendengaran pada karyawan patal se-Jawa Timur yang terpapar bising

Hipotesis pertama sampai dengan ketiga diturunkan berdasarkan cara berfikir pada kerangka konseptual bahwa akumulasi pengetahuan memberikan umpan balik



kepada proses kognitif di dalam mengartikan berbagai kemampuan yang dimiliki oleh individu berupa umur, pendidikan, pengalaman dan pelatihan misal jalur pendidikan menjadi kapabilitas baru, sehingga semakin tinggi tingkat pendidikan akan semakin mampu mengartikan berbagai stimulan dari luar menjadi pengetahuan. Bagi seorang karyawan dengan tingkat pendidikan tinggi (misal tingkat SLTA) kaidah-kaidah keselamatan kerja baik berupa jurnal, peraturan perundangan, hasil penelitian, majalah ilmiah dan lain sebagainya dapat diserap menjadi pengetahuan dan kapabilitas baru yang pada gilirannya dapat meningkatan sikap pencegahan meningkatnya ambang pendengaran.

Namun demikian fenomena ini tidak terjadi pada karyawan dengan tingkat pendidikan rendah (misalnya SD atau SLTP) pada kelompok ini kaidah-kaidah keselamatan kerja dari berbagai sumber tersebut harus dikemas terlebih dahulu menjadi paket pendidikan non formal agar mudah diserap oleh karyawan tersebut menjadi pengetahuan dan kapabilitas baru yang pada gilirannya dapat menaikkan sikap bahkan tindakan pencegahan meningkatnya ambang pendengaran. Sedangkan hipotesis ke dua muncul karena pada waktu memasuki dunia kerja seorang karyawan telah mempunyai umur, tingkat pendidikan formal, pengalaman dan pelatihan tertentu sehingga ketika terpapar kebisingan terjadi interaksi dalam mencegah meningkatnya ambang pendengaran. Selanjutnya hipotesis ketiga muncul karena faktor individu (kemampuan individu 'lemah, cukup dan kuat"), dengan berbagai mekanisme peredamannya dan paparan kebisingan yang terjadi saling berinteraksi dalam membentuk ambang pendengaran.

Metode penelitian ini menggunakan rancangan observasional dengan metode yang digunakan adalah *expost facto* yang didesain berdasar *cross sectional*. Sampel diambil 150 dari 948 pekerja PT Sandang Nusantara pada Patal Lawang dan Grati menggunakan *stratified proportional random sampling*. Hal ini didasarkan atas kenyataan bahwa pada saat dilakukan penelitian para pekerja di industri sudah mempunyai besaran dari semua variabel bebas yang diukur, faktor individu yaitu: pendidikan formal, pengalaman kerja, pelatihan dan umur, sedang mekanisme peredaman yaitu: jenjang dari nilai reduksinya yang dapat mewakili dari luas ruang, *barrier*, transmisi dari sumber sampai tempat pekerja bekerja sedang faktor intensitas adalah intensitas kebisingan dan durasinya, kemudian variabel terikatnya ambang pendengarannya akibat intensitas kebisingan adalah ambang dengar yang mampu didengar pada frekuensi 3000 Hz, 4000 Hz dan 6000Hz. Data tersebut dianalisis yang digunakan *General Model Manova* dengan program komputer.

Hasil penelitian ini adalah (1) ada perbedaan yang signifikan ($p < 0,05$) umur, pendidikan, pelatihan terhadap ambang pendengaran, namun pengalaman tidak ada perbedaan yang bermakna terhadap ambang pendengaran. (2) ada interaksi yang signifikan ($p < 0,05$) antara tingkat umur, pendidikan formal, pengalaman dengan pelatihan keselamatan kerja terhadap ambang pendengaran, (3) ada interaksi yang signifikan ($p < 0,05$) antara tingkat faktor individu derngan intensitas kebisingan, namun tidak berinteraksi dengan mekanisme peredaman. (4) efektifitas pelatihan keselamatan kerja (pencegahan meningkatnya ambang pendengaran) cenderung naik seiring dengan kenaikan waktu perlakuan pelatihan keselamatan kerja, artinya semakin lama rentang waktu perlakuan pelatihan keselamatan kerja semakin turun ambang pendengaran, kecuali yang terjadi pada tingkat umur 40-60 tahun tidak menunjukan efektifitas yang berarti.

Berdasarkan temuan di atas dapat diberikan saran sebagai berikut : 1) Untuk meningkatkan sikap pencegahan meningkatnya ambang pendengaran karyawan mekanik di industri patal se-Jawa Timur, para pengambil keputusan di industri menyelenggarakan pelatihan keselamatan kerja, karena terbukti pelatihan keselamatan kerja dapat menaikkan sikap pencegahan meningkatnya ambang pendengaran yang pada gilirannya menghindari terjadinya peningkatan ambang pendengaran karyawan. 2) Paket pelatihan keselamatan kerja yang diselenggarakan sebaiknya mempunyai komposisi materi dan lama penyelenggaraan lebih dari tujuh hari. 3) Agar pelatihan keselamatan kerja berhasil guna secara maksimal, maka harus diperhatikan tingkat pendidikan formal peserta didik, karena telah terbukti bahwa besarnya kontribusi pendidikan keselamatan kerja dalam membentuk pencegahan meningkatnya ambang pendengaran dipengaruhi oleh tingkat pendidikan formal peserta didik, pengalaman dan umur. 4) Untuk meningkatkan sikap pencegahan naiknya ambang pendengaran para karyawan dengan pendidikan formal SLTA, sebaiknya tidak harus melalui pendidikan non formal keselamatan kerja jangka panjang/periodik, namun cukup dengan pelatihan medium atau menciptakan lingkungan yang dapat menjadi sumber belajar keselamatan kerja misalnya dengan selalu menyebarkan informasi tentang peraturan perundangan keselamatan kerja, data nilai ambang batas (NAB), pentujuk alat pelindung telinga, majalah ilmiah keselamatan kerja dan lain sebagainya. 5) Karyawan dengan pendidikan formal SD dan SLTP pelatihan keselamatan kerja jangka pendek cenderung rerata ambang pendengarannya lebih besar dibandingkan dengan karyawan yang lain.

Terakhir para pimpinan perusahaan sebaiknya menaruh perhatian lebih besar terhadap kelompok karyawan ini misalnya dalam bentuk peraturan yang tidak memperkenankan karyawan ini pelatihan keselamatan kerja jangka pendek bekerja tanpa menggunakan APT dan bekerja di tempat yang intensitas kebisingan tinggi sehingga karyawanan rawan terhadap gangguan pendengaran, karena intensitas kebisingan semakin tinggi kontribusi faktor individu semakin rendah untuk mencegah naiknya ambang pendengaran.

SUMMARY

Interaction Individual Factors, Noise Absorbing Mechanism and Intensity toward Hearing Threshold

Mardji

Industrial activities cannot evade from any mechanical processes, which the produces much noise; even that much that surely exceed our permissible noise level. For example, data from an institution reveals that a grinding machine can amplify noise level from 80 to 104 dB at a conduit systemization in West Virginia. The data fortified by some of *National Institute for Occupational Safety and Health* (NIOSH) investigations show that cutting-paper machinery produces from 95 to 108 dB; cleaning and polishing areas in chemical manufacturer 88 to 113 dB; glass manufacturer, 79–92 dB; workshop 115 dB; and military (police) shooting training 157–160 dB.

The obvious consequence of the noise is the hearing-loss process of the workers. This negative effect is proven by a report that shows that many workers are still suffering from deafness. The data from an institution indicate that during the 1996 until 1998 the number of the working incident that happened had reached 3472 cases, from which 82% were hearing-loss accidents caused by working-environment noise.

Hearing-loss effect can actually be prevented through various procedures or controlling mechanisms, either technically and administratively, i.e. giving the noise-source noise absorbing mechanism and or administrative, i.e. job-rotation or applying standard regulation that requires every worker or employee equips himself with full or complete hearing-protective equipment necessary. However, all of those efforts, in turn, depend on the other factors, i.e. individual, which consists of: 1) levels of education, experience, and/or training that positively influence and determine the worker's own behavior and attitude toward using any hearing-protective equipment to prevent his/her own deafness and 2) the worker's own age that biologically affects his/her level of deafness. Thus, the problem of the study can then be formulated as the worker's hearing threshold caused by working-noise intensity in relation to the individual factors.

The working-safety-training program, which includes hearing-loss prevention, sets its main goals on 1) developing the worker's awareness of the existence of the hearing-loss process; 2) developing the anticipating method(s) to prevent hearing threshold by work-noise; 3) developing the worker's habit to always use hearing-protective equipment in working environment and 4) integrating the understanding toward the concept of hearing-loss by work-noise and the use of ear-safety tools into the worker's philosophical and normative structures. Such a program is usually contained with both work-safety learning and training, as the two are commonly viewed to be the best methods in developing worker's attitude toward hearing-loss prevention.

When an employee starts his work at a certain company, he within himself, must have had, a background of formal education in certain level. This level will affect his basic attitude in working. When the worker receives training in working-

safety, especially for hearing threshold prevention, an interaction will emerge that involve a relationships between his age category, his educational background, his working experience, and the training for hearing threshold prevention itself.

Such interactions are important to be studied since each of them maintains its own classification or level. Formal education, for instance, has its strata of SD (elementary school), SLTP (junior high school) and SLTA (senior high school), while the working-safety program can be categorised into, 'short, medium, long/periodic' team training. Worker's experience is classified into "0-9 years, 10-20 years, 21-30 years and 31-40 years", where the ages are grouped into "21-30 years, 31-40 years, 41-50 years and 51-60 years". Besides these, the individual factors of the worker can be classified as 'weak, average and strong'; the noise absorbing mechanism as "1 = 0-5.9, 2 = 6-15, 3 = 15,10-26,40dB"; while noise-intensity as "70-77dB, 78-85dB, 86 - 88dB, and 88.10-93dB".

The uniqueness of the interactions is the problem that this research is trying to study, the research question, therefore are formulated as: Is there any difference in individual factors that consist of education, experience, age and training toward hearing threshold of the workers in all-East Java weaving manufactory who are exposed to noisy? Is there any interaction between individual factors that consist of education, experience, age and training toward hearing threshold of the workers in all-East Java weaving manufactory workers said to be exposed to noisy? Is there any interaction between individual factors, noise absorbing mechanism and noise-intensity toward hearing threshold of the workers in all-East Java weaving manufactory workers said to be exposed to noisy? How much the individual factors (that consist of education, experience, age and training), noise absorbing mechanism and noise-intensity contribute toward the hearing threshold the workers in all-East Java weaving manufactory workers?

Some of the theoretical benefits that can be drawn from this research include scientific analysis into: 1) the most dominant variable of the individual factors that consist of education, experience, age and training in preventing hearing threshold by work-environment; 2) the interaction between individual factors that consist of education, experience, age and training in preventing hearing-loss suffered by the workers said to be exposed to noise; 3) the interaction between individual factors, noise-intensity, and noise absorbing mechanism in relation to deafness suffered by workers said to be exposed to noisy; and 4) figuring the contribution on the deafness by the interaction between the individual factors, noise absorbing mechanism and noise-intensity.

While some of the practical benefits are as follow. Firstly, the results of the research will be a direct proposition to any company of hearing-loss risk within some areas potential to be the noise-source in relation to the worker's individual factors, noise absorbing mechanism and noise-intensity. By this, the company's policy makers may then select, arrange or place employees based on the workers in the working environment accordingly to their own specific individual characteristics. Secondly, as the stepping ground for minimizing hearing-loss risk by training program, since a model found through the research shows that the longer the training, the better the result, except for those in 40-60 years old. This model can be useful for company's policy makers, especially in weaving manufacturers, the Department of Labors, or the

training program planners to come up with more suitable model to achieve more successful results.

The hypotheses of this study are a) there is a difference relationship between individual factors to the hearing threshold at all-East Java weaving manufactory workers exposed to noisy; b) there is an interaction within the individual in connection with the hearing threshold at all-East Java weaving manufactory workers exposed to noisy; c) there is an interaction between individual factors, noise absorbing mechanism and noise-intensity toward the hearing threshold suffered by all-East Java weaving manufactory workers exposed to noisy.

The first untill the third hypotheses are formulated based on the conceptual framework stating that accumulation in knowledge will give direct contribution to the cognitive process in understanding various abilities of certain individual that consist of age, education, experience and training to be his own new capability. It means that the higher the level of, education, the better the certain individual to be able to discern any outside stimulants to be his knowledge. For workers with higher background of formal education, senior high school, for instance, the working-safety standards or norms within their various forms of journals, governmental rules, research results, scientific magazines, etc. are more discernable to enlighten their own attitude toward hearing threshold prevention.

Regrettably, such phenomenon may be not likely to occurre within workers with lesser educational background. For this group, the working-safety standards must first be packed up as a bundle of non-formal educational training, so that they can easily be absorbed and transformed into a new ready-set knowledge and capabilities, which in turn, will increase the group's own behavior and attitude toward hearing-loss prevention. The second hypothesis is deduced from the fact that by the time a worker entering his working environment, he must have had certain level of age, formal education, experience and training, as to that certain level of (preliminary) interaction to prevent hearing loss occurred when they are exposed to noisy. The third hypothesis is deduced from the fact that individual factors (person's ability as 'weak, average, strong'), any noise absorbing mechanisms and noise-expository are interacting each other and contributing to the hearing threshold.

The method of the study is observational design with *expost facto* based on cross-sectional pattern. The sample taken is numbered 150 out of 948 workers of PT Sandang Nusantara at Patal Lawang and Grati using stratified proportional random sampling. The method is taken based on the fact that as the research is being conducted, the workers have already had some certain measurements of all of the independent variables being measured, that are individual factors, i.e. formal education, working experience, training and age; noise absorbing mechanism, i.e. stages of its reduction value representing space width, barrier, noise transmission from the source to the place of work; and intensity factors, i.e. noise intensity and its duration. The dependent variable is the hearing-loss due to noise intensity that represents the hearing threshold at the frequencies of 3000 Hz, 4000 Hz and 6000 Hz. The data were analyzed using computerized general model *Manova*.

The research findings are 1) there are significant differences ($p < 0.05$) within the correlation between the age, education and training toward hearing threshold, but there is little significant ($p > 0.05$) found within the correlation of experience and

hearing threshold; 2) there are significant interaction ($p < 0.05$) between age level, formal education, experience and work-safety training toward hearing threshold; 3) there is a significant interaction ($p < 0.05$) between levels of individual factors and noise-intensity, but not with noise absorbing mechanism; 4) the effectiveness of work-safety training program (hearing-loss prevention) tends to increase by the prolonged time of training, i.e. the longer the training held, the lower the hearing threshold takes place, with exception for whom of 40-60 year-old that shows little effectiveness.

Findings, then it is suggested that: 1) Base on the company's policy makers are necessary to conduct any working-safety training for the weaving industrial workers in East Java to increase their preventive attitude toward hearing threshold, since it has been proven that training can actually positively raise the worker's basic behavior toward hearing-loss, which in turn can decrease hearing threshold accident; 2) both period and material composition of the training be longer than seven days; 3) the policy makers should always pay more attention to the trainee's background of formal education in order to make the training be more successful, as it is proven that education, working experience and age can really influence the process of hearing-loss prevention; 4) for workers with higher level of educational background (senior high school), the training should not be held within the longer/periodical program, but either within the medium one or by creating an working environment suitable enough to propel the worker's own initiative to learn, that is by supplementing the environment with any information concerning the working-safety regulations, data of maximum hearing threshold, standard procedures of hearing-protective equipment, scientific magazines, etc. and 5) for the company's policy makers pay much more attention to the workers with lower of educational background (elementary and junior high schools), as their likelihood to suffer hearing threshold is greater than the other workers.

Finally, it is also suggested that some specific rules are considered necessary such as prohibiting those workers to work without complete hearing-protective equipment and/or not allowing them to work at highly noisy places that can increase hearing-loss, because the training should be a conducted for any workers working in the area with highly noise intensity, since the higher the intensity, the lower the contribution of individual factors to prevent hearing threshold.

ABSTRACT

Interaction Individual Factors, Noise Absorbing Mechanism and Intensity toward Noise Hearing Threshold

Mardji

This research seeked to find the interaction between the individual factors, (consisting of age, experience, education and training), noise absorbing mechanism and noise intensity toward threshold at the weaving manufactories in East Java. The populations taken are those working in production and maintenance section within the industrial domains.

The sample taken is numbered 150 out of 948 workers of PT. Sandang Nusantara at Patal Lawang and Grati using stratified proportional random sampling. In order to avoid some inconsistency within the observation, the researcher had asked help from unit leaders, and for the deafness evaluation from the company's medical specialists. The independent variables of the study are individual factors (age, education, experience and training), noise absorbing mechanisms and noise-intensity; and the dependent variable is hearing threshold. The data are analyzed with multivariate method, i.e. general model Manova.

Result showed firstly, there is a significant difference ($p<0.05$) in age, education and training, but little significant ($p>0.05$) in experience; secondly, there is a significant interaction ($p<0.05$) between age and training and training with education and experience; and thirdly, there is a significant interaction ($p<0.05$) takes place between individual factors and noise-intensity, but only little interaction ($p>0.05$) between noise absorbing mechanism with both individual factors and noise-intensity.

It can be concluded that working-safety-training program be highly necessary to prevent hearing threshold in East Java weaving manufactories workers; the program should be held in more than a week; some compositions such as age and education should be given more attention in order to achieve better training results; the training program should be a conducted for any workers working in the area with highly noise-intensity, since the higher the intensity, the lower the contribution of individual factors to prevent increase hearing threshold.

Keywords: *interaction, individual factors, absorbing mechanism, noise intensity, hearing threshold.*