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Chapter 1

New Paradigms in Ergonomics: The Positive Ergonomics

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Additional information is available at the end of the chapter

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Abstract

This chapter aims look at ergonomics from a positive point of view. According to International Ergonomics Association, ergonomics is "the scientific discipline concerned with the understanding of interactions among humans and other elements of a system, and the profession that applies theory, principles, data and methods to design in order to optimize human well-being and overall system performance". The major types of ergonomics. Some of them are physical, cognitive, and positive ergonomics. **Positive ergonomics**: Positive ergonomics refers to a new type of ergonomics that stresses the positive aspects of the man-machine system. Its major interest is to make "human-machine system" enjoyable where the human feels pleasant. **Emotional ergonomics**: Similar to positive ergonomics, emotional ergonomics refers to a type of ergonomics that pays attention to the emotional aspects of the man-machine system. **Spiritual ergonomics**: Spiritual ergonomics is based on the idea that spirit is a key factor which determines the employee's health and success in the man machine system, no matter what he/she is doing in that system. **New approach to Occupational health**: When considering the legacy of occupational health, we find that two approaches were adopted throughout of its history. These are: professional harmonization and ergonomics approaches.

Keywords: positive ergonomics, positive design, emotional ergonomics, emotional design, spiritual ergonomics, spiritual design

1. Introduction

Since that man was found on the ground, he realized the value of work. Work occupies an important place in human life. It is a key field after school where individual capabilities, competencies, and skills are shown. Also, it may be the main source from which human beings get the financial resources they need for daily life. Similarly, the place of work is where man

lives for many years (almost half of his life). In addition, it is the best space in which the individual meets with others and builds different social relations. Equally, work puts the individual in a particular socio-economic level. Finally, work may be a source of happiness or misery. If the work is corresponding with man's knowledge, skills, abilities, and inclinations and hopes, it is a source of happiness, pleasure, and joy. On the other hand, if disharmony is seen between work and man's abilities, hopes, inclinations, and ambitions, it becomes a source of misery. Finally, work is the only way for production. You cannot imagine that the trees bear fruit without being maintained by man, and the companies, factories, and industrial institutions do not have production without the work of both employers and employees [1].

To make the work a source of happiness, and to avoid making it a source of misery, work has to be done accompanied by the following conditions:

- Assuring work is ergonomically designed.
- Coupling work with conviction and faith.
- Assuring mastery of work.
- Getting rid of hypocrisy at work.
- Putting the necessary efforts work needs.
- Assuring continuity at work.
- Practicing continuous evaluation to work.

Various authors have previously mentioned that ergonomics, especially positive ergonomics, can make workplace a place where employees feel comfortable, happy, calm, and confident with an increased ability to grow and innovate. In addition, they will experience an improved health, greater well-being, promoted excellence, and a better quality of life [2–4]. When workers are having this positive spirit, productivity will most probably flourish and increase. Therefore, it is advised that positive ergonomics should be studied and implemented in the near future [5].

Motivation for the research: The present research was done to shed light on the importance of positiveness in the evolution of ergonomics. It aims to show that positive ergonomics helps to make individuals happier at work. Researchers have performed a lot of research, but in the areas of physical, cognitive, and organizational ergonomics, but little attention has been given to the positive ergonomics. Martino and Morris [4] mentioned that ergonomic thinking has been in some respects positive thinking, if we take into consideration that ergonomics was and still seeking to design or redesign equipment, devices, and processes. In fact, the design goal is a part of positive ergonomics.

Problem statement: Positive psychology specialists [6–8] have for long time suggested that the application of positive psychology principles makes workers happy at work place. Even though positive psychologists state that it can improve workers' happiness in the workplace, but it is an appeal that attains the improvement from within the individual (attitudes, trends, the good personality features, etc.), as happiness is an internal state that does not have strong

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relationship with external factors. Thus, the positive ergonomics approach which takes into account both individual and context factors affecting work, can to a large extent bring happiness to the workplace. Therefore, this chapter debates the positive ergonomics.

Research questions:: The chapter aims to answer the following questions:

- What is ergonomics?
- What is positive ergonomics?
- What is the relationship of positive ergonomics with occupational health?

2. Approach

A literature search was conducted, using a variety of keywords (ergonomics, positiveness, positive ergonomics, positive design, emotional ergonomics, emotional design, spiritual ergonomics, and spiritual design). This search was conducted as follows: Initially, an electronic search in various databases such as Ergonomics Abstracts, Scopus, ScienceDirect, and PsycINFO was conducted. In addition, manual searches were carried out in the majority of ergonomics journals: Applied Ergonomics, Ergonomics, International Journal of Industrial Ergonomics, International Journal of Human Computer Studies, Theoretical Issues in Ergonomics Science, New Technology, Work and Employment, Reviews of Human Factors and Ergonomics, Human Factors and Ergonomics in Manufacturing, and Le Travail Humain. The result was a number of scientific papers and books were collected (see references) on which this survey research is based.

3. Results

3.1. What is ergonomics?

Ergonomics is a multidisciplinary science. Therefore, there is no single definition of ergonomics. The reader may find it difficult to choose the right definition. Researchers [9–11] have attempted to confine multiple existing definitions. They also tried to extract the contents of these definitions. Some of the main results were: in the years before 1970, the big focus of ergonomics was on effectiveness. In the years between 1970 and 1979, the focus was still on effectiveness and to some extent on comfort and efficiency. In the years after 1980, the focus is still on effectiveness and other factors, such as safety and usability.

Human Factors and Ergonomics Society [12] introduced four criteria which can be used to choose the most comprehensive definition.

1. Does the definition reflect the breadth of human factors and ergonomics?
2. Does the definition comprise both research (theory) and design (application)?
3. Does the definition reflect the scientific nature of the field?
4. Is the definition clear and concise?

In the light of these criteria, two definitions are presented. First, Chapanis [13] wrote on human factors and ergonomics: "Both are concerned with designing for human use and apply information about human characteristics, capacities, and limitations to the design of human tasks, machines, machine systems, and environments so that people can work safely, comfortably, and effectively". After about 45 years, International Ergonomics Association [1] wrote on ergonomics: "Ergonomics (or human factors) is the scientific discipline concerned with the understanding of interactions among humans and other elements of a system, and the profession that applies theory, principles, data and methods to design in order to optimize human well-being and overall system performance" [1].

Looking at these two definitions from the angle of what this chapter advocates, the two definitions, the old and the new, have not clearly stressed the new development in ergonomics (positive, emotional, and spiritual ergonomics).

Development of ergonomics: Talking about the history of ergonomics, one ought to differentiate between non-official and official histories. As to the non-official level, since the man was found on the surface of the earth, he has been designing the simple tools he used in his life, such as knives, spears, and swords to fit his abilities and capacities so that they are used effectively. However, as to the official level, it is believed that ergonomics was officially started in 1949. In a meeting of the British Admiralty, Prof. Hywell Murrell (1908–1984) proposed the name ergonomics that was officially accepted in 1950. Since then, the concept of ergonomics was used.

The development of official ergonomics can be attributed to a great extent to Second World War.

- During the war, researchers through analyzing frequent aircraft accidents, which were piloted by experienced pilots, discovered that accidents are caused by the mistakes of the pilots as well as the bad design of the displays and controls of the aircraft.
- After the war, the impact on countries, especially the allies, was very heavy with great deaths and destruction. Reconstruction has to be done quickly. Authorities have known that the mission needs a lot of efforts and facilities. Ergonomics that emerged almost after the Second World War was one of the different sciences that have to participate in the construction of affected countries.

During a period of over 60 years, ergonomics has greatly developed. The major developments are:

- At the methodological level: Despite the fact that in the early years of ergonomics, most research was using quantitative methods as they are more objective methods [14]. In the twenty-first century, ergonomists felt that there are some ergonomics topics where qualitative methods should be used. Then, a new methodology was widely constituted [15–17].
- At the subject matter level, new types of ergonomics have come into being. They are cognitive ergonomics [18, 19], positive ergonomics [20, 21], emotional ergonomics [22–25], and spiritual ergonomics [26, 27].

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Importance of ergonomics: Ergonomics is about both the individual and production. When efficiently applied, ergonomics benefits both human health and company economy.

Human health: Investing in ergonomics increases the health and wellbeing of personnel. Effective ergonomic practices reduce work injuries, for example, carpal tunnel syndrome, tendonitis, and low back pain. These injuries are now considered to be among the leading causes for disability in the modern workplace [28, 29]. In USA, Occupational Safety & Health Administration (OSHA) estimates that as many as 1.8 million work-related musculoskeletal disorders occur every year. These injuries result in a loss of 650,000 work days per year; more than one-third of the total amount of workdays that are lost on an annual basis [30]. Anton and Weeks [31] believe that approximately 80% of participants reported work-related musculoskeletal symptoms. Furthermore, Friedman et al. [32] mention that workplace amputation is a widespread, disabling, costly, and preventable public health problem, with thousands of occupational amputations occurring each year among American workers. Ergonomic practices reduce fatigue. If an employee is less fatigued, he/ she is also less likely to be injured on the job, reducing both absenteeism and the risk of insurance claims. Further, they reduce indirect costs resulting from failure to apply ergonomics in the workplace. When an employee gets injured at work it generates numerous indirect costs such as the payment of the accident expenses, the cost of having some workers log overtime to cover for a missing worker, the decreased morale of employees when knowing a colleague is injured, and the legal and investigation costs if the case reaches the court. Also, they reduce instances of absenteeism due to work-related injury or illness. Similarly, they help them to do more work because they need to take less time to rest.

Besides, ergonomic practices increase the morale of the workers. When workers feel they are being interested in, their morale is boosted, they like the work environment, and most probably, their relationships become stronger.

Company economics: Effective ergonomic practices can increase productivity by reducing the time taken to complete daily tasks. As a result, company profits can also be increased. In addition to the productivity, the quality of production increases. On the other hand, if ergonomics is excluded, most probably, workplaces will cost business a lot of money. In a significant study, Tompa et al. [33] concluded that ergonomic interventions were worth undertaking on the basis of their financial merits. They assisted to reduce frequency or severity of injuries, which eventually result in productivity improvements that result in savings.

Types of ergonomics: Similar to all science, ergonomics, when it originated, was a limited field, but after some years of research, its field expanded to include various subjects. These days, researchers are talking about multiple types of ergonomics. But it would be a good idea to classify these types. The basis of classification would be:

- Classification based upon body part: physical, cognitive, emotional, and spiritual ergonomics.
- Classification based upon application area: educational, industrial, agricultural, and service ergonomics.
- Classification based upon interest area: traditional and transfer of technology ergonomics.
- Classification based upon level of intervention: organizational and individual ergonomics.

- Classification based upon type of intervention: positive and negative ergonomics.
- Classification based upon subject of intervention: worker-centered and production-centered ergonomics.

It should be noted that the most widely used classification in many ergonomics books and literature is the first one (physical, cognitive, and organizational). However, the problem with this classification is not exhaustive as it excludes emotional and spiritual types of ergonomics and includes another type (organizational ergonomics) that belongs to another classification. It is well-known that a good classification is one that is stable, flexible, exhaustive, and having mutually exclusive classes [34].

3.2. What is positive ergonomics?

Around the mid of the last century, psychology researchers put forward the idea that psychology in addition to studying the negative aspects of human personality should also, study the positive ones. In these instances, the positive psychology movement emerged. According to Gable and Haidt [35], positive psychology is the study of the conditions and processes that contribute to the flourishing or optimal functioning of people, groups, and institutions. Previously researchers were more interested in the negative aspects of human personality such as depression, violence, racism, and pessimism, but, less interested in positive aspects such as joy, peace, altruism, humbleness, and optimism. The major aim was not only to return human being to normal, but also to develop different abilities and strengths. The effects of this approach (paradigm shift) did not remain confined to the field of psychology, but surpassed them to the field of ergonomics. In the last few years, researchers began to talk about the positive ergonomics, and the concept of hedonomics appeared.

Definition: Positive ergonomics refers to a new type of ergonomics that stresses the positive aspects of the man-machine system. Previously, ergonomics used to make sure that man-machine system, especially the complex one, is functioning well. Therefore, before positive ergonomics, what was intended from man-machine systems is functionality; however, in the era of positive ergonomics, attention was shifted to pleasurablility. The major mission of positive ergonomics is to understand and foster the factors that allow man-machine systems to flourish. The major interest of positive ergonomics is to make "human-machine system" enjoyable where the human feels pleasant. Traditional ergonomics aimed to make man-machine system effective so that man will not make work accidents, will not have occupational illnesses, and will not have a lot of occupational stress. Despite the fact that the above-mentioned goals are very human, but positive ergonomics advocates claim that the twenty-first century ergonomics should not remain confined to the prevention of occupational diseases, and work accidents only, but should move forward to the promotion of strengths and virtues such as happiness, tranquility, hope, psychological stability, and appreciation. Positive ergonomists see that the promotion of theses virtues and strengths help human beings to overcome the pressures that lead to disturbances of mental health, such as anxiety, depression, despair, and lack of self-esteem. Therefore, positive ergonomics works at two levels: the preventive

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level and the therapeutic level. At the preventive level, it strengthens the human psychological adjustment. However, on the therapeutic one, it helps who suffers from maladjustment to strengthen adjustment mechanisms.

Development: During the nineteenth century and before, emotional dimension was an important part in human personality. If researchers were not studying it, they knew it is an important part of the human personality [36–38]. Nevertheless, in the twentieth century especially after the reign of positivism, human scientists did not neglect the emotional dimension only, but even the cognitive and spiritual dimensions on the ground that these dimensions are not measurable and quantifiable. In the second half of the twentieth century, and after the rise of the cognitive, humanistic, and religious schools in human sciences, researchers started shedding light on subjects such as cognition, emotions, and spirit. The result was, many research papers published in many fields, including positive ergonomics.

Positive design: According to Desmet and Pohlmeyer [39], positive design is an umbrella term for many forms of design (design for experience, design for human capabilities, design for socially constructive behavior, design for social innovation, and design for well-being) that affect subjective well-being of individuals and communities. Positive design seeks to achieve the following two goals: to increase the subjective well-being of individuals, and to raise an enduring appreciation of their lives. In some cases, it may not be possible to achieve simultaneously both goals but at least to a certain degree. The above-mentioned authors state that the three ingredients of positive design are design for pleasure, design for personal significance, and design for virtue. If these components are met in a particular design, it is called "a flourishing design", which means a design that helps individuals to flourish or using Maslow's words: "to become actualized in what he is potentially" [40].

The key components of positive design are happiness and comfort.

Happiness: Human beings have been interested in happiness for years. Various approaches have been given to explain what happiness means [41]. The most famous ones are:

- The Hedonic approach to happiness: Happiness is a matter of personal feeling. The more pleasant experiences the individual comes across, the more happiness he has. Everybody feels it in his/ her way depending mainly on his/her personality constitution and social uprising. Some key advocates of this approach are Hobbes [42] and Kahneman et al. [43].
- The desire approach to happiness: According to this approach, happiness is dependent on the individual getting what he/ she wants. The more you get of what you want, the happier you are. One of the key advocates of this approach is Davis [44].
- The spiritual approach to happiness: This approach dates back to the middle-age philosophy. According to this approach, happiness is achieved when the individual converts his/ her soul from acquisitiveness and materialism to complete devotion to God. One of the great advocates of this approach is Al-Ghazzali [45]. In his famous book "The Alchemy of Happiness", stresses that happiness requires committing oneself to the teachings of the Islamic religion, and avoid committing sins. According to him, there are four main

constituents of happiness: self-knowledge, knowledge of God, knowledge of this world as it really is, and the knowledge of the next world as it really is.

- The positive psychology approach to happiness: This approach stresses the connection between thinking about happiness and doing what leads to it. One of the representatives of this approach is Seligman. In his 2011 book [46], Flourish: A Visionary New Understanding of Happiness and Well-being, he mentions that the keys to happiness are PERMA that is achieved through: improving (P) positive emotions, (E) engagement, (R) relationships, (M) meaning, and (A) accomplishment.

Comfort: When a person feels in a particular time he/ she is not suffering from pain and hardship he/she may be in comfort. But if he/she is having a certain amount of hardship, he/ she is uncomfortable. Generally speaking, human beings ought to have a certain amount of comfort which can either be big or small. This amount can last for long time or for a short time. Ergonomics from its emergence advocated that it aims to achieve various goals including human comfort. Seeing various definitions especially the ones of the 1970s and 1980s, comfort is one of these aims. The following are examples:

- Ergonomics is an applied area of psychology and engineering which concerns itself with the design of the physical conditions, machines, and other equipment in relation to human capabilities, learning capacities, efficiency, and comfort [47].
- Ergonomics is a branch of psychology concerned with the design of environments and equipment that promote optimum use of human capabilities and optimum efficiency and comfort [48].
- Ergonomics is the application of information about human characteristics, capacities, and limitations to the design of machines, machine-systems, and environments so that people can live and work safely, comfortably, and effectively. The term also designates the profession that deals with such problems [49].
- Ergonomics studies the role of humans in complex systems, the design of equipment and facilities for human use, and the development of environments for comfort and safety [50].

The positive ergonomics components: The major components of positive ergonomics are: emotional and spiritual ergonomics.

Emotional ergonomics: Researchers [51–54], believe that emotions can be classified on basis of their content, into positive such as joy, contentment, interest and love, and negative emotions such as fear, anger, disgust, and shame. Each emotion either positive or negative is associated with a tendency towards a specific type of action that enhances either success or survival in the specific context. Positive emotions work like a reward that strengthen behavior, whereas negative emotions work like a punishment to stop a behavior from occurring [55, 56]. The reader may come across other related concepts such as mood and affect. In order not to confuse these concepts with emotion, each is defined. First, all these concepts refer to feeling human beings experience. Second, each refers to a particular type of feeling as follows:

- Emotions are intense feelings that generally have well-defined subject (human beings or objects).
- Moods are feelings that are less intense as emotions. Besides, they often have no well-defined subject.
- Affects are feelings that are either intense (emotion) or moderate (mood) feelings.

Definition: Emotional ergonomics pays attention to the emotional aspects of the man-machine system. Man, when in the man-machine system, cannot free himself from his emotions even if they tried to do so. Those who consider that a human being could leave aside his emotions while working do not know the truth about man. A healthy man-machine system is one where workers are allowed to express their emotions [57]. Expressing positive emotions will help man-machine system to obtain favorable outcomes; on the other hand, negative emotions will prevent man-machine system from obtaining positive results [58].

Associated with emotional ergonomics, a new concept used in ergonomics, which is hedonomics. According to Hancock et al. [5], hedonomics refers to the scientific study of enjoyable aspects of man-machine system. Since the concept is new, Helander [59] believes that the problem of ergonomists is now to conceptualize hedonomics, to propose theories that can be used for design, and to build appropriate measurement tools.

It is to note that other terms have been given for hedonomics. Blythe et al. [60] used the term "funology". Jordan [24] used "design for pleasure", Nagamachi [61], used "Kansei engineering", and Helander and Khalid [62] used "affective design".

At the early years of ergonomics, ergonomists were more concerned about physical and cognitive aspects of the system. But, after more than 60 years of ergonomic research, and in response to well spread tendency of positiveness in human sciences, they are very enthusiastic to shed light on the affective side of the man-machine system with the aim of making it pleasurable.

Development: Gendron and Feldman-Barrett [63] think that contemporary psychological research on emotions has gone through three clearly identified stages. These are:

1. The golden stage (before behaviorism): In this stage, research on emotions flourished at the hands of researchers like Darwin [36], James [37], Spencer [64], and Cannon [65].
2. The dark stage (behaviorism time): In this stage, researchers stopped research in the emotion subject. In almost 40 years, nothing worthwhile was published. In fact, it was the dominance of the behavioral approach that marginalized the topic of emotions, as it is of little significance [66, 67].
3. The renaissance stage (from 1960s): In this stage, interest returned again to the topic of emotions which was behind the expansion of conceptual and empirical research, providing a number of influential ideas and theories. One of the influential ideas is what Zajonc [68] had mentioned that emotions function independently of cognition and sometimes it dominates it. Some of the significant theories are: Zajonc theory of emotion [69], the

theory of the evolutionary adaptive value of emotions [70], the broaden-and-build theory of positive emotions [71], and three levels of product emotion theory [72].

Emotional design: It is a design that takes into consideration emotions of users while designing or redesigning goods and products. It maximizes the good (positive) emotions and minimizes the bad (negative) one. In some cases, other names (hedonic design, affective design, affective human factors design, human-centered design, empathetic design) are used for emotional design. Researchers have found that products designed according to emotional design induce among consumers positive feelings which in turn increase pleasure and satisfaction. A good example of emotional design is any product (or features of a product) you loved (you love) in your life.

There are a lot of books written about the design, but the books about emotional design are quite new. They are the result of emotion renaissance era mentioned above. Some of these worthy emotional design books are:

- Seductive Interaction Design: Creating Playful, Fun, and Effective User Experiences by: Anderson [73].
- Designing for Emotion by Walter [22].
- Designing Pleasurable Products: an Introduction to New Human Factors by Jordan [24].
- Designing Emotions by Desmet [74].
- Design and Emotion by McDonagh et al. [75].
- Design for Emotion, by van Gorp and Adams [76].

For Norman [77], emotional design has three levels as follows:

3.2.1. First level, the visceral level

Definition: The visceral level is a level of design in which appearance is very important. It is the initial and immediate reaction to any design that is generally coming from strong emotions and not from logic or reason. These immediate reactions whether in the form of likes or dislikes are often learned. When babies are born, they do not have likes or dislikes, but by time, they learn to like some things (food, drink, cloths, etc…), and to dislike other things. Since these likes and dislikes have been learned, they can be changed by learning as well. In the area of marketing, companies these days rely heavily on this type of design to sell the outputs of goods and services provided. Sometimes, when an enterprise feels that a particular commodity is experiencing a recession, they quickly resort to improve the external appearance. It has been found that product's visceral design communicates to consumers' diverse values. Some of which are aesthetic, functional, and ergonomic values [78]. In addition, it has been found that visceral design helps create commercial success [79]. Nanda et al. [80] found that varying the aesthetic design of the product they studied (BlackBerry Pearl) had a significant impact on emotional reaction of subjects. They found that subjects preBfer the original, piano black treatment of the BlackBerry Pearl over the visually treated versions of the smartphone.

Measurement: It is measured by observing immediate reactions of the individual when he/she is put in front of a design.

Design requirements: It requires the knowledge, skills and abilities of designer. When designers design a particular item, it can be liked or disliked by consumers. If positive feedback is to be given to designer, the product physical features (look, sound, feel, taste, and smell) should be in line with consumer characteristics. When these criteria are taken into account, no doubt both designer and consumer will be pleased. But on the other hand, if negative feedback is given, both designer and consumer are frustrated. Why this kind of stressing situation happens? In situations where products are designed away from the customers' physical, cognitive, emotional, and spiritual information, usually these are the results that are commonly attained.

3.2.2. Second level, the behavioral level

Definition: The behavioral level is a level of design in which performance not appearance which matters. In the previous (visceral) design, appearance was essential. Here performance of the product is the most important criteria for choosing that product. If a pen is not writing, it is not a good product. Similarly, if a shaver cannot shave smoothly, it is not a good product. Products can have many other uses, but what is important, is the use for which the product was basically designed. As an example is the chair. Chairs are normally designed for sitting. But, in some cases, they are used to reach the top of a tall shelf. In some other cases, they are used as a hanger to hang the coat in office work, or as a lock to keep the door of a room open, or as a weapon in cases of fight. The design of cup holders in cars is a good example of behavioral design. May be you know that the German car company (BMW) refused to incorporate it in its cars under the pretext that car are for driving, not for drinking. However, when BMW car sales went down, they had (around 2011) to incorporate it.

Measurement: Behavioral design can be measured using well-known methods such as observation, questionnaires, interviews, focus groups, etc.

Design requirements: To accomplish behavioral design, designers should be able to discover the consumers' needs associated with products' functions, usability, understandability, and physical feel. To achieve this goal, designers are advised to carry out field observation and to interview focus groups individuals, so that needs are clearly seen.

3.2.3. Third level, the reflective level

Definition: The reflective level is a level of design in which emotions not performance appearance which matter. It can be called emotional design. In this type of design, emotions play a great role. It is based on the idea that emotions function independently of cognition. It is the design that makes the customer to build a positive association with the product at hand. This positive association boosts the sales level. In marketing and advertising sciences, reflective design is becoming very essential. It has been found that an effective reflective design enhances the emotional connection consumers have with brands [81], ad likeability [82], and recall [83].

It is this design that makes a product very liked in one area/ culture, and disliked in another area/ culture.

Measurement: Similar to behavioral design, reflective design can be measured using well-known methods such as observation, questionnaires, interviews, focus groups, etc.

Design requirements: Designers who want to produce design at this level should not base their designs on their emotions themselves. Despite the fact that customers' emotions are diversified and varied, they ought to understand them and design goods and products accordingly.

Wherever you go, you are plagued with so many products with very different designs. These designs can be good or bad designs. It depends on the user judgments. If a particular design pleases the user, it is a good design. Otherwise it is not. It has been believed that ergonomically designed products are automatically pleasurable products [84]. However, from the emotional design point of view, ergonomically designed products, may be efficient ones, but they may not be pleasing the intended users. In the area of multimedia learning material, it has been found that if learning evokes positive emotions among learners, the learning process will be facilitated [85].

Spiritual ergonomics: As long as all workers or at least the majority of workers believe in Allah/ God/ or other universal spirit, they bring with them to man-machine system, their belief and faith and they will be very pleased if their spiritual needs are satisfied in their work. Workers who are denied spiritual needs are not motivated to do the work and may be subjected to work stress, accidents, and other diseases. In the first two or three decades of ergonomics, attention was paid to workers bodies and cognitions; however, in the recent decades attention was shifted to emotional and spiritual sides of workers.

Definition: Spiritual ergonomics pays a lot of attention to the spiritual side of the man in the man-machine system. It is based on the idea that spirit is a key factor which determines the employee's health and success in the man-machine system, no matter what he/she is doing in that system. Spiritualism is important to individuals for various reasons. Spiritual people are generally satisfied with their lives in comparison to their counterparts who are not spiritual. Some are:

- Spiritual people give meaning to life.
- Spiritual people do not lose hope.
- Spiritual people do not suffer or suffer little stress.
- Spiritual people are covered with happiness and contentment.
- Spiritual people self-actualize.

Development: Spiritual ergonomics is a part of the spiritual movement which has spread in the world especially in the seventies, for several reasons. First is the perceived failure of Christianity. Christianity over the years suffered a lot of criticism. Christianity is related to colonialism. Also it is related to and supported for dictatorship and totalitarian regimes.

Second is the failure of secular humanism to provide spiritual and ethical guidance for the future. In addition, researchers like Cacioppe [86] argue that modern world is afflicted by social, economic, and environmental problems that are caused mainly by disabling the spiritual aspects of human beings. The absence of these spiritual aspects led to the absence of love, compassion, altruism, and helping behavior. The search for these virtues is essentially a spiritual journey.

Spiritual design: Initially, the researcher notes that he could not find past studies and literature on this design. Research in this area has been delayed too much from the rest of the designs that have been referred to. However, it is a design that takes into consideration spiritual needs of users while designing or redesigning goods and products. Spiritual needs differ depending on the religious education the individual gets upon socialization. What a Christian person gets is to a great extent different from what a Muslim or Jewish or Buddhist gets. As stated by Highfield and Cason [87], the spiritual needs that patients seek to satisfy are the following four:

- The need for meaning and purpose.
- The need to give love.
- The need to receive love.
- The need for forgiveness, creativity, and hope.

On the other hand, in Islam, the very important spiritual needs are:

- Needs related to acts of worship such as prayer, and fasting.
- Needs related to morality as good dealing with people and honesty.
- Needs related to the relationship between the individual and Allah (God) as fear, hope, humility, sincerity, and kindness.

Measurement: Researchers have done a lot of work to measure spiritual design. The result is a number of tools that can be used. But it has to be mentioned that the choice of a particular tool is subject to a lot of considerations foremost, religion owed by the individual and the culture in which he/she resides. Some of these tools are observation, interviews, questionnaires, and other scales. For some of these tools, you can study:

1. The Spirituality Index of Well-Being by Daaleman and Frey [88].
2. The Spirituality and Spiritual Care Rating Scale by McSherry et al. [89].
3. The Spiritual Care Competence Scale by van Leeuwen et al. [90].

Design requirements: Goods and products are not randomly designed by engineers. If they want them to be desirable commodities, and customers to be happy with them, they must include what states that the spiritual aspect of customers has been taken into account. Spiritual values of people should be known to designers and engineers, otherwise harmony with spiritual values of individuals may not be possible.

3.3. What is the relationship of positive ergonomics with occupational health?

Occupational health refers to a series of actions that aim at protecting workers and reducing the risk of equipment, and machinery and attempting to prevent work accidents, injuries and illnesses, and providing safe work environment. Occupational health intervenes in all areas of life.

In 1957, the first Joint ILO/WHO Committee of Occupational Health assembled, and identified areas of interest in occupational health in the following: (1) the maintenance and promotion of workers' health and working capacity; (2) the improvement of working environment and work to become conducive to safety and health; (3) the development of work organizations and working cultures in a direction which supports health and safety at work; and (4) the promotion of a positive social climate to smooth operations and enhance productivity of the undertakings [91].

Alli [92] believes that occupational safety and health is "the science of the anticipation, recognition, evaluation, and control of hazards arising in or from the workplace that could impair the health and well-being of workers".

But how occupational safety tried to implement industrial safety at work environment? When considering the legacy of occupational health, we find that two approaches were adopted throughout of its history. These are: professional harmonization and ergonomics approaches.

The professional harmonization approach is concerned with minimizing loss by aiding in the preservation and protection of both human and other physical assets in the workplace. It primarily involves monitoring the workplace and advising employers or management on the best ways to prevent and minimize losses [93]. In order for this approach to be successful, authorities must do a series of actions including tough selection and training of workers. Workers are not selected based on fitting the direct requirement of work only, but based on fitting indirect requirements as well. Other features such as accident proneness [94], various obsessions [95], mental toughness [96], etc., are important issues for the success in the twentieth century.

The ergonomic approach is concerned with implementing ergonomics principles at work. Authorities are requested to make sure that ergonomics principles are applied in the work area [97]. When applied, occupational health will improve [98, 99]. Here, it is to mention that designing or redesigning tools, machines, equipment, workplaces, and work environment to fit the physical parts of the workers is not enough. Data concerning other aspects of the worker, for example, cognitive capacities, emotional skills, and spiritual aptitudes should also be collected to be used in designing or redesigning work. This new orientation of ergonomics takes into account the physical, mental, emotional, and spiritual aspects of the human factor. It is based on the idea that the workers can be happy at work only if they feel that the needs of these different aspects are saturated. This is what the new approach to occupational health, aspires to achieve.

To be sure about the effectiveness of twenty-first century occupational health, the two abovementioned approaches (professional harmonization and ergonomics) are to be sequentially used.

4. Conclusions

The official age of ergonomics is now about 66 years. In this long life, ergonomics has witnessed many developments. Some of them have been on the level of subject matter, for example, cognitive ergonomics in the 1960s, organizational ergonomics in the 1970s, positive ergonomics in the 1980s, emotional ergonomics in 1990s and spiritual ergonomics in the new millennium. Some other developments have been on the methodological level, for example, the use of qualitative methods in the 1980s and mixed methods in the 1990s.

In this chapter, we shed light on subject matter developments where we discussed positive ergonomics with its subsequent design, i.e., the positive design. Then emotional ergonomics with its consequent emotional design were debated. At the end, the newly born development, i.e., the spiritual ergonomics with spiritual design were discussed. Our hope is that future research will ponder greatly into these developments. Time in which these important human personality aspects (emotions and spiritual aspects) have been excluded or left out has gone and may never return.

If ergonomics takes these issues into account, it will not only succeed, but it will spread widely among the people of the earth from different orientations and religions.

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