

Impact of brain thinking preference on engineering project performance

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Abstract: The main objective of this study is to determine the extent of the effect of brain thinking preference (brain quadrants) on engineering project performance. A descriptive approach methodology was used to achieve the objective of this work by developing a special questionnaire contains many tracks. The data collected by the questionnaires with a sample size of (500) from different engineering projects in public and private sectors were analyzed using a statistical package for the social science (SPSS –V21). The main results showed that the most influencing criteria on the project's performance was "the freedom to choose a job", which had an impact on the project's performance by 84.3%, and the respondents' answers in favor of this parameter was 78.2%. This indicates that the parameter of the independent coefficient (preference for mental thinking) raises the level of project performance and thus directly affects the project performance measures which are: The effectiveness, efficiency, employee loyalty and project quality. While the lowest effect is the parameter "the creativity and skill "which has 61.3%, with respondents answers in favors of this parameter is 36.6%. Also the results showed that when employees have the freedom to choice their own preferred job will have a great impact on project quality and thus increasing the percentage of profits. So, giving employees the freedom to choose a job and measuring the extent of creativity and skill will give the opportunity to increase a job performance. Also, results have shown that spreading awareness of the preference for cerebral thinking and moving towards the preferred cerebral quadrant of a person's brain will unleash the best level of creativity, skill and conscious future outlook in all scientific and practical fields.

KEYWORDS: BRAIN THINKING PARAMETERS, QUADRANTS, PROJECT PERFORMANCE PARAMETERS, EMPLOYEES

Research background: The purpose of this work was to better understand what constitutes a competent thinker and decision-maker, the competences required to be such that to study the variables that may affect a person's brain decision. Furthermore, making wise decisions is essential for thriving in the business world, particularly when it comes to project performance. Wise decision-making calls for managers to be aware of their surroundings and how they may affect the operations of their projects [1,2]. The brain is a complex organ that controls thought, memory, emotion, touch, motor skills, vision, breathing, temperature, hunger, and every process that regulates our body. Together, the brain and spinal cord that extends from it make up the central nervous system or CNS. To be effective in today's complex and changing world, managers need new insights and skills that up- end conventional thinking about human potential, trust, energy, initiative, and commitment. Neuroscience holds the key to accomplishing this goal. The old belief was that all sensory input went directly to the brain, where a behavioral response was shaped. The new findings show that the gut-brain and the heart-brain are involved first. Brain Thinking: Way of solving problems that combines a rational and convergent approach with creative and divergent thought processes. It includes four fundamental dimensions: creativity, future vision, intelligent opportunism, and thinking in the time [3,4]. Understood the concept of brain dominance and knew that there were three different types of thinking according to the dominant half:

- The thinking style associated with the right half.
- The thinking pattern associated with the left half.
- Integrated thinking style.

Figure (1) is a schematic representation of Herrmann's metaphoric whole brain model and functions associated with each part.

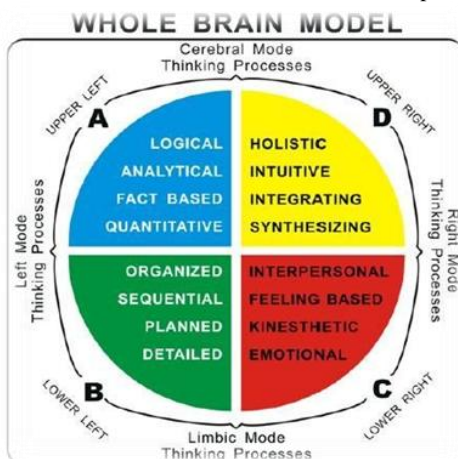


Figure (1) Herrmann's whole brain model [10]

According to [6] these days' lack of braining thinking among managers is obvious. Moreover [7,8, 9] they added that organizations are being involved in competitive and chaotic situations. Because of that, the researcher focused on this problem throughout the current research to explore whether the decisions are being made based on strategic and brain thinking preferences of the project performance of employees, so this work will explain the impact and understanding of the Brain thinking preference and produce a finding of practical relevance through answering the following main question: What is The Impact of Brain thinking preference on project performance?"

Quadrant A [10]: (The Left Cerebral Brain Thinking), is associated with logical thinking, analysis of facts and processing numbers, technical, problem solving. A person with a quadrant dominance is rational and realistic, thinks critically, and likes to deal with numbers and technical matters opinions and feelings are generally not considered as important as facts. People with a strong preference to think in these ways are also attracted to professions that require such thinking. Examples of such careers include technical, legal, and financial areas, including accounting and tax law, engineering. mathematics, and some middle management positions.

Quadrant B (The Left Limbic Brain Thinking) the (B) quadrant has some similarity to the (A) quadrant in that both are left-brain thinking preferences, deals with planning, organizing facts and activities, and careful detailed review, administrative conservative and controlled. A person who relies heavily on quadrant (B) thinking is well organized, reliable, and neat. These people like to establish plans and procedures and get things done on time.

Quadrant C (The Right Limbic Brain Thinking), is associated with interpersonal relationships and affects intuitive and emotional thought processes. (C) quadrant individuals are sensitive to others and enjoy interacting with and teaching others they are typically emotional and expressive, outgoing, and supportive of others. They are concerned with people's feelings more than with facts and procedures. People with single-dominant profiles in the (A) or (B) quadrants probably see individuals with strong (C) quadrant preferences as being very "touchy-feely.". Individuals with single dominant (C) profiles would be very "feeling" and people oriented.

Quadrant D (The Right Cerebral Brain Thinking), is associated with conceptualizing, synthesizing, and integrating facts and patterns, with seeing the big picture rather than the details. Words that describe this quadrant are artistic, holistic, imaginative, synthesizer, and conceptualizer A person with a quadrant (D) preference is visionary and imaginative, likes to speculate, break the rules, take risks and may be impetuous, these people are curious and enjoy experimentation, playfulness, and change.

How Does Your Profile Compare to Others? :-

Herrmann's research led to the development of a scientifically validated instrument that can quantify the degree of thinking preferences for specific modes within the whole brain model. The Herrmann dominance instrument is a questionnaire consisting of (120) items that quantifies mental thinking preferences. The results of the questionnaire are a visual plot of the thinking preferences of the individual accompanied by a data summary sheet, the model gives a breakdown of what each individual selected and registers it according to the different quadrants [11]. Finally, these data are complemented by an explanation report that describes and highlights important aspects of the profile in order to understand the profile, it is important to explain (quadrants and modes of thinking, the preference code, the adjective pair data, the profile score) shown in figure (2).

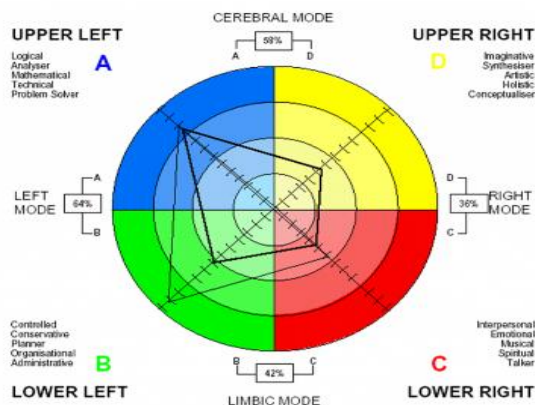


Figure (2) The Ultimate Guide to HBDI, Herrmann Brain Dominance Instrument [11]

Quadrants and Modes of Thinking: Thinking preferences are measured not only by the four quadrants (A, B, C or D) [12], but also by four modes (upper left, lower left, upper right and lower right). The upper modes right and left, combining quadrants (A and D) quadrants, are more cognitive and intellectual, preferring thinking in abstract, conceptual modes. The lower modes combining the (B and C) quadrants, are grounded and emotional in nature. These modes often prefer visceral, "gut" and concrete approaches [9]. The left modes combining the (A and B) quadrants, prefer concise efficient processes with realistic, disciplined and orderly approaches. The right modes combining the (C and D) quadrants, include key mental processes such as intuitive and perceptive thinking, as well as idealistic, expressive and open approaches, all cases of these styles were detailed according to

A and B Dominant Profiles: An (A and B) dominant profile is the profile of the left brain thinker [9]. There is an internal coherence between the (A and B) quadrants. That is, they tend to reinforce each another. For example, the analytical and logical processes of the (A) quadrant support the structural and procedural characteristics of the (B) quadrant. This is a very common profile, especially among males. People with this profile are logical, analytical, technically oriented, and good problem solvers. They are also good planners, organizers, and implementers. They do not shy away from administrative details.

A and D dominant Profiles: The (A and D) dominant profile is the profile of the cerebral thinker. The great minds and great inventors of our time exhibit these two thinking styles. People with this profile have all of the thinking preferences of the (A) quadrant plus a preference for the conceptual, creative, and integrative styles. They like to invent things and new ways of doing things and are quite happy to be individual contributors.

C and D Dominant Profiles: The (C and D) dominant profile is the profile of the right-brain thinker. People with this profile are creative and inventive because of their (D) quadrant preferences but are also people. They are intuitive, holistic, and interpersonal. Entrepreneurs, teachers, salespersons, and trainers often exhibit this thinking style pattern.

B and D Dominant Profiles: So far we have talked about double dominant thinking styles where the two thinking styles were compatible with each another. They were both right brain, or left brain, or cerebral, or limbic. Interesting cases arise when the two dominant thinking styles are fundamentally different from one another, either (B and D) or (A and C). This individual has a double dominant profile, but interestingly, it is across the diagonal between quadrants (B and D). The person was an interior designer. Think of this person in a project manager's role. We would guess that she or he would be good at seeing the "big picture" of the project and at developing project strategy, but she or he would also be interested in doing detailed implementation planning as well. In other words, she could see both the forest and the trees.

B and C Dominant Profiles: This is the profile of the limbic thinker. Because of his or her dominant [18] quadrant score this person has a strong preference for conserve thinking and the need for structure and detailed procedures for all that he or she does. The dominant (C) quadrant score indicates a strong preference for interpersonal relations and concern for how the individual will react to situations. These people are results oriented, and they respond well to deadlines and enjoy working with others.

A, B, and C Dominant Profiles: Simply put, this is a left brain individual with the added concern for the individual. He or she makes a good team player and enjoys analyzing data, building things, and seeing things work. Technical managers will often display this thinking style profile.

A, B, C, and D Dominant Profiles: Only about 3 percent of the population exhibits a preference for all four quadrants. People with this profile are well balanced and can understand the thinking modes of all types of people. They are good facilitators and can deal effectively with every situation. They are adaptable and make good leaders because of their whole brain approach and even handed ways. the successful CEO will often display a four quadrant thinking preference.

Research Objectives: The main aim of this study is to find the extent of the "Impact of Brain thinking preference on engineering project performance." While the sub-objectives are to study the followings:

1. Investigating the impact of the brain thinking parameters (creativity and skill, future vision, intelligent opportunism, mental tendencies, freedom to choice the job) on loyalty of employee.
2. Identifying the individual of brain thinking parameters on engineering project performance.
3. Identifying the level of brain thinking preference awareness of the employees.
4. Determine the overall brain thinking parameters impact on engineering project performance.

Research Variables: As can be seen from the research model in figure (3), Brain thinking is the independent variable, and its dimensions are (creativity and skill, future vision, intelligent opportunism, mental tendencies, and freedom to choice the job). Also, these dimensions were adopted by well-known researchers in the field of management [13,14,15]. Which are hypothesized to affect the dependent variables of the engineering project performance (i.e., efficiency of employee, effectiveness employee, project quality, loyalty of employees). The model in figure 3 represents the predicted association and relationships between brain thinking and organization performance.

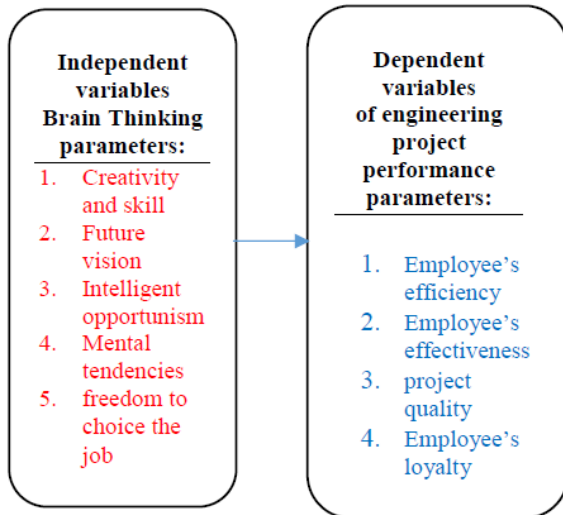


Figure (3): The Independent and dependent variables

Research Population: The study population consisted of all employees in the public sector. The total number of them was (4500) employees, surveying this large of population would consume considerable budget, time, and effort. For this reason, a study sample is calculated based on this number using a formula, which is expressed [16].

$$n = \frac{\hat{n}}{1 + \frac{z^2 \times p^{\wedge}(1 - p^{\wedge})}{\epsilon^2 N}} \dots \dots \dots (1)$$

Where:

\hat{n} – Number of the sampel magnitude related to unlimited population

p^{\wedge} – The proporation of the population

ϵ -The errors frontier

z -The score

N -The realistic population number

\hat{n} can be computed vie the expression: (calculator. net,2023)

$$\hat{n} = \frac{z^2 \times p^{\wedge}(1 - p^{\wedge})}{\epsilon^2} \dots \dots \dots (2)$$

Substitung ϵ as 0.05, p^{\wedge} as 0.5, and z as 1.96 can lead to \hat{n} :

$$\hat{n} = \frac{1.96^2 \times 0.5(1 - 0.5)}{0.05^2} = 384.2$$

Thus, the number of study sample equals will be calculated by substitung N as 4500 persons which is calculated using the equation (1):

$$n = \frac{384.2}{1 + \frac{1.96^2 \times 0.5(1 - 0.5)}{0.05^2 \times 4500}} = 354$$

As shown in the results of the calculation of the formula, of the sample for this study is 354, but a study sample of 500 was taken in this work to be more convenient for reducing the error.

Sampling and Sampling Frame: After determining the size of the population on which the study will be conducted, estimated at (4500) employees. The sample was selected randomly with a total number of (500) respondents based on the (500) questionnaires, which it was distributed electronically via an electronic link using social networking sites (Facebook, and WhatsApp), and was also distributed on paper in the public and private sectors, on 2023.

Questionnaire Design: The questionnaire consists of three parts; first, the title of the study that includes the important question as filtering question which is (Did your mental orientation influence the choice of your preferred type of work?), If your answer is YES, please proceed to the next question. Part two consists of six questions about the respondent's demographic profile; included is an

instrument that uses nominal and ordinal scales, such as Gender, Age, Qualification, Experience in work, Business sector, and regional distribution. Part three of the questionnaire was designed to measure variables, (Creativity and skill, future vision, intelligent opportunism, Mental tendencies, freedom to choice the job, efficiency of the employee, effectiveness of the employee, project quality, and loyalty of employees) [10].

Validity of the Study Tool: The study tool (questionnaire) was presented to a group of arbitrators with academic competence and experience in a number of public and private Jordanian universities. Their opinion on questionnaire and ascertaining its suitability, in terms of the number of paragraphs, clarity, accuracy, coherence, and coherence, and any other notes. They deem it appropriate, to delete, change, or add and consider this review process and the subsequent correction and modification of most of them as a test of the apparent validity of the tool.

Reliability of the Study Tool: To ensure the stability of the tool, Cronbach's Alpha was calculated using the formula-3 and the results were shown in figure (4). It is clear all the values are greater 0.6, which indicate the model of the study is valid [17].

$$\alpha = \frac{N \cdot \bar{c}}{\bar{v} + (N - 1) \cdot \bar{c}} \dots \dots \dots (3)$$

Where:

N - number of items

\bar{c} -bar the mean internal variance between items

\bar{v} -bar the mean of the total variance of the items

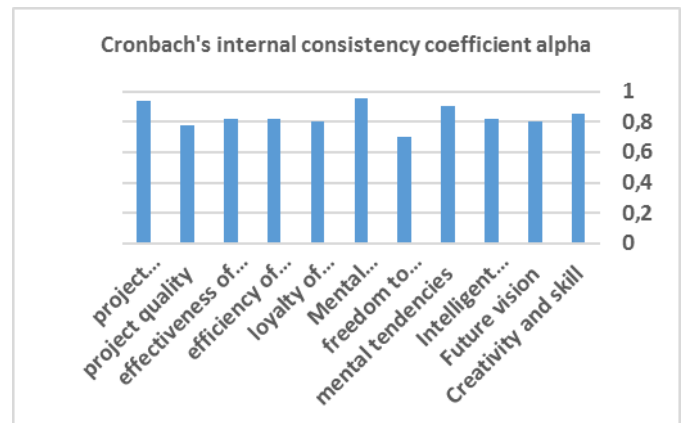


Figure (4) Cronbach's internal consistency coefficient alpha

Statistical Analysis: A Five-point Likert scale was adopted to correct the study tools, by giving criteria of numerical weight (strongly satisfied = 5, satisfied = 4, satisfactory = 3, unsatisfactory = 2, highly unsatisfactory = 1) and it is numerically represented (5, 4, 3, 2, 1) on ranking, and the following scale has been adopted for the purposes of analyzing the results [18]:

- From 1.00 - 2.33 is low
- From 2.34 - 3.67 is medium
- From 3.68 - 5.00 is large

The scale was calculated using the following equation: [19].

$$\frac{\text{Scale upper limit (5)} - \text{Scale lower limit (1)}}{\text{Number of categories required (3)}} \dots \dots \dots (1)$$

$$= (5 - 1) / 3 = (1.33)$$

Then adding the answer (1.33) to the end of each category.

Normal Distribution Test: The normal distribution test for the data was carried out based on the value of the skewness coefficient, to test whether the data used in the analysis followed a normal distribution or not, so the results were as shown in figure (5). These dimensions/variables are hypothesized to affect the dependent variable project performance. It is noted from figure (5), that the value of the Skewness coefficient for all paragraphs of the questionnaire was less than one, and this means that the data follows a normal distribution.

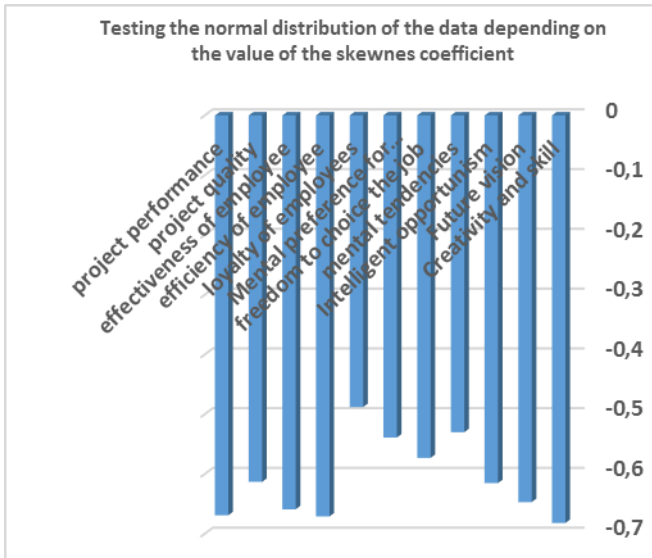


Figure (5) Normal distribution of the data

Testing the Suitability of the Study: The linear correlation test was used to ensure that there is no high correlation between the independent variables, based on the variance inflation coefficient (VIF) test, and the tolerance test for each of the independent variables, as the independent variables of the model must be independent among themselves. Also to ensure that purpose, will use this test, which is one of the ways to get rid of the problem of multi-collinearity, knowing that the variance inflation coefficient must not exceed the value (10). While the value of the allowable variance test must be greater than (0.05), and by calculating the previous coefficients for each independent variable by using the (VIF) equation as shown in formula (4), the obtained results are listed in the following figure (6). [20, 21].

$$VIF = \frac{1}{1 - R_i^2} = \frac{1}{\text{Tolerance}} \dots\dots\dots(4)$$

Where: R_i^2 : represents the unadjusted coefficient of determination for regressing the independent variable (i) on the remaining variables

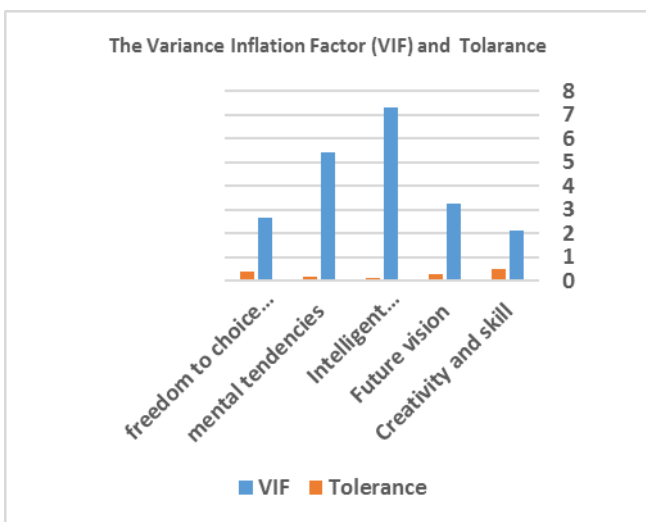


Figure (6): The Variance Inflation Factor (VIF) and tolerance

Analysis of Results: The data were analyzed using a statistical package for the social science version 21 (SPSS-V21) as follows: *Respondents answers to the brain thinking parameters:* “What is the level of brain thinking (i.e., creativity and skills, future vision, intelligent opportunism, mental tendencies, and freedom to choice the job)” at projects as perceived by employees? The arithmetic means and standard deviations of the study sample's responses to

the mental preference for choosing the type of work were extracted. As shown in figure (7), the dimensions/variables are hypothesized to affect the dependent variable project performance.

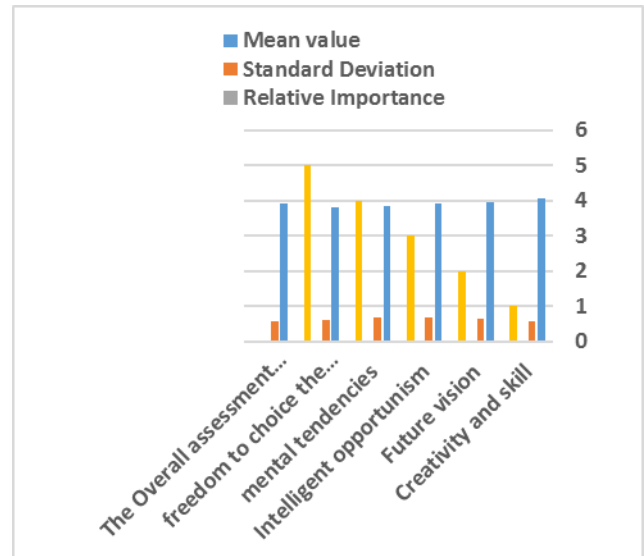


Figure (7) The Arithmetic Means and Standard deviations related of the mental Preference for choosing the type of work

Figure (7) shows that the relative importance of the mental preference for choosing the type of work was high, as the general arithmetic mean in overall assessment question was (3.93) and with a standard deviation of (0.563), where creativity and skill came in the first place with an arithmetic mean of (4.07) and a standard deviation of (0.590) and of high relative importance. Whereas freedom of occupational choice came in the last rank, with an arithmetic mean of (3.81) and a standard deviation of (0.627), with high relative importance. The participants ranked creativity and skills as being the most important influencing factors, which was followed by future vision, Intelligent opportunism, mental tendencies, and then the freedom to choose the job. This result is attributed to successful innovation depends on employees' creativity, so firms must innovate to survive and succeed. Creativity is essential for organizations so it affects employee efficiency and job satisfaction, as the successful implementation of creativity-based training programs contributes to the development of creative skills. The arithmetic means, standard deviations, and relative importance of each dimension of mental preference for choosing the type of work were extracted separately and the results are shown in figures (8 to 11).

First parameter: “Creativity and skill”

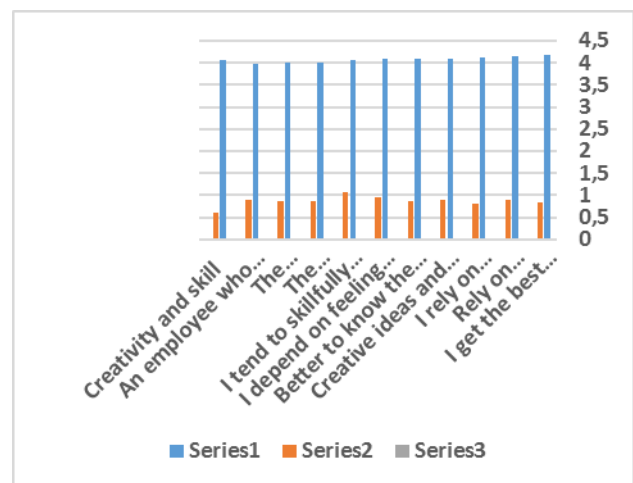


Figure (8): The arithmetic means and standard deviations related to creativity and skill

Figure (8) shows that the relative importance of creativity and skill was high, as the general arithmetic mean was (4.07) with a standard deviation of (0.590), this indicates there is a great agreement about the importance of this parameter in brain thinking of the employees and the paragraph that states “I get the best ideas and creative plans when I am not busy with something” came ranked first among the paragraphs, with an arithmetic mean of (4.17) and a standard deviation of (0.832), with high relative importance. Whereas, the paragraph stating “the employee who thinks and works creatively helps achieve the strategic goals and increase their competitiveness” ranked last among the paragraphs, with an arithmetic mean (3.96) and a standard deviation (0.901), and a high relative importance. The majority of respondents agreed that the best creative ideas and plans can be generated when employees are not busy. These results are attributable to the fact that silence is useful for the creative process as it enables one to generate ideas without restrictions, guidelines, or interruptions.

Second parameter: “The future vision”

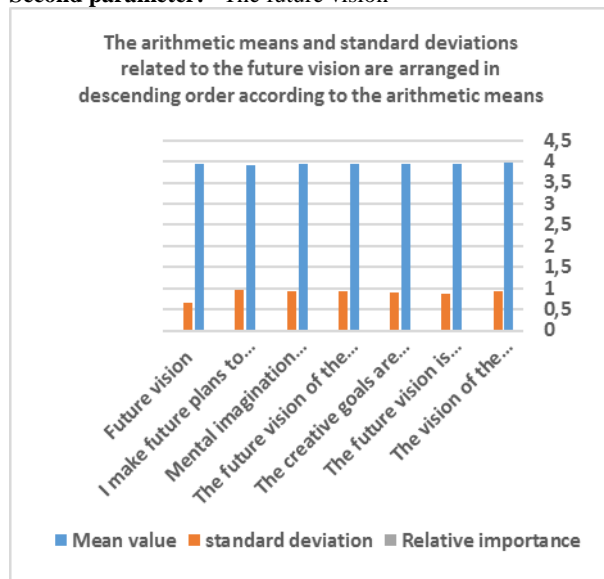


Figure (9) The arithmetic means and standard deviations related to the future vision

Figure (9) shows that the relative importance of the future vision was high, as the general arithmetic mean was (3.94) with a standard deviation of (0.647), and the paragraph stating “the vision of the institution/company reflects the future direction of the program it offers” It ranked first among the paragraphs, with an arithmetic mean of (3.96), a standard deviation of (0.924), and a high relative importance. This indicates there is a great agreement about the importance of this parameter in brain thinking of the employees. Whereas, the paragraph stating “I make future plans to overcome risks and mistakes at work” ranked last among the paragraphs, with an arithmetic mean (3.92) and a standard deviation (0.953), with a high relative importance. This result is attributable to the fact that prosperous businesses have the propensity to have visionary goals like hiring competent, knowledgeable, confident, experienced, loyal, and skilled employees who will devote their full efforts, attitude, and determination to giving the company a competitive edge in the market

Third parameter: “Loyalty of employees”

It is clear from figure (10) that the relative importance of loyalty of employees was high, as the general arithmetic mean was (3.79) with a standard deviation of (0.640), and the paragraph stating “I maintain the property of the institution/company honestly and faithfully” came in the first place. Between paragraphs with an arithmetic mean of (3.81), a standard deviation of (0.908), and a high relative importance. Whereas, the paragraph stating “I feel that I am part of the administrative system of the institution/company” ranked last among the paragraphs, with an arithmetic mean (3.77) and a standard deviation (0.957), with a high relative importance. The majority of participants choose the paragraph that states “I

maintain the property of the institution/company honestly and faithfully”. These results are in line with a study conducted by [22], the researchers said that integrity has a significant and positive impact on employee performance, and a high-integrity employee will perform better performance.

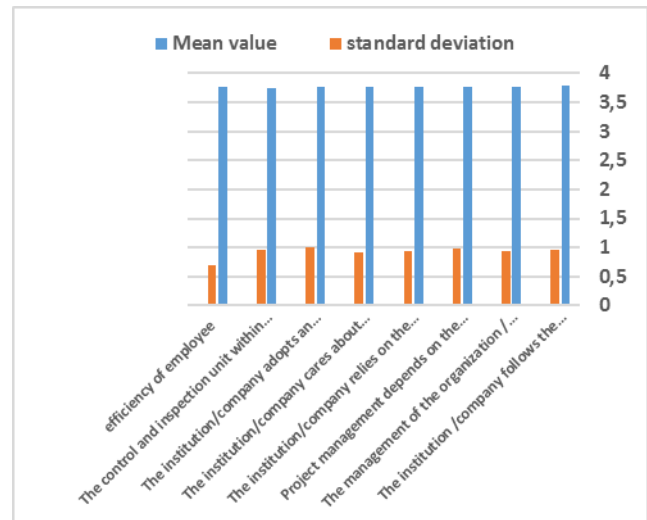


Figure (10). The arithmetic means and standard deviations related to employee loyalty

Forth parameter: “Efficiency of Employees”

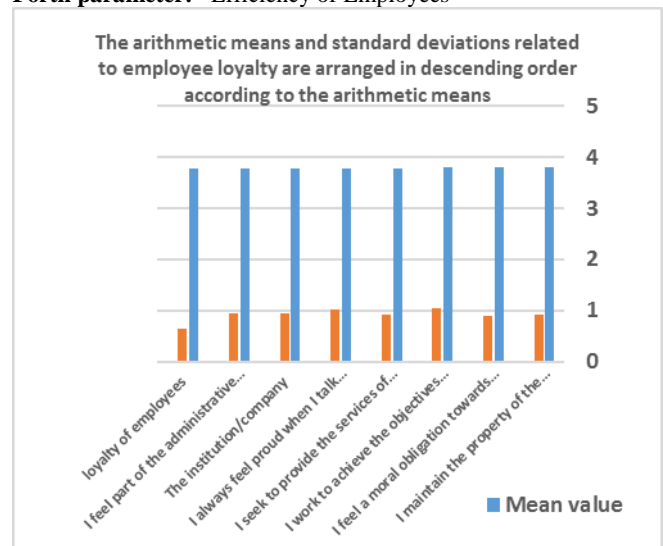


Figure (11): The arithmetic means and standard deviations related to employee efficiency

While figure (11) shows that the relative importance of the employee’s efficiency was high, as the general arithmetic mean was (3.77) with a standard deviation of (0.694), and the paragraph stating “the institution/company follows the approach of maximizing value and reducing cost during the production process in Projects” ranked first among the paragraphs, with an arithmetic mean of (3.78) and a standard deviation of (0.948), with a high relative importance. Whereas, the paragraph stating “The control and inspection unit within the institution/company enjoys high efficiency” ranked last among the paragraphs, with an arithmetic mean (3.75) and a standard deviation (0.952) with a high relative importance. These results are attributable to the fact that an organization’s performance can be enhanced by granting its employees autonomy in the workplace, freedom of choice regarding how they complete tasks, and the opportunity to contribute their ideas. Effective and efficient employees are likely to perform less well if they are not adequately motivated. So, employees need to work in an environment where creativity is unrestricted.

Hypothesis Tests: ‘First sub-hypothesis’ to verify the validity of the first sub-hypothesis, a simple linear regression was used for the impact of the creativity and skills dimension on the performance of projects in Jordan, and the results as shown in figure (12).

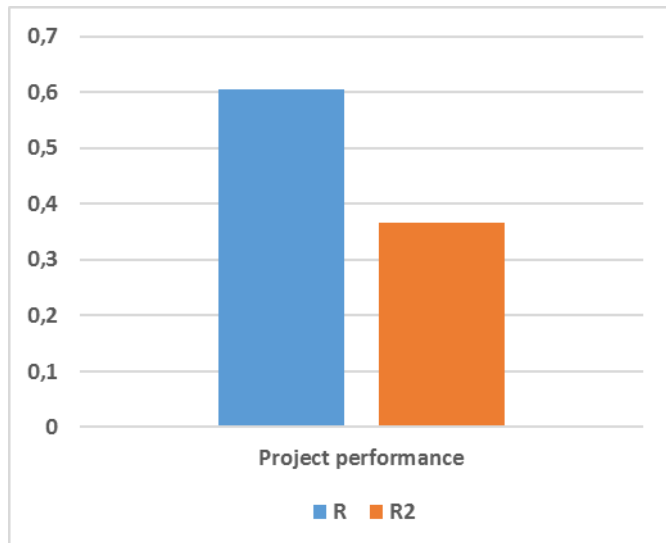


Figure (12): Results of a simple linear regression of the impact of creativity and skills

Figure (12) shows that there is a statistically significant effect of the dimension of creativity and skills in the performance of projects in Jordan, where the correlation coefficient ($R = 0.605$), which indicates the existence of a statistically significant correlation between the independent variable (creativity and skills) and the dependent variable (project performance). The value of the coefficient of determination ($R^2 = 0.366$), which indicates that (creativity and skills) explained 36.6% of the variation in (project performance), while the remainder is due to other variables that were not included in the model, and the value ($F = 287.681$) at a confidence level equal to ($\text{sig} = 0.00$), and this confirms the significance of the regression at a significance level of ($\alpha < 0.05$). It appears from the figure of coefficients that the values of (B) in the dimension of creativity and skills amounted to (0.613), and that the value of (t) was (16.961) with a statistical significance of (0.000), which indicates that the effect of this dimension is significant. These results indicate the rejection of the first sub-hypothesis and the acceptance of the alternative hypothesis, which states: "There is a statistically significant effect at the significance level ($\alpha \leq 0.05$) for creativity and skills dimension in the performance of projects in Jordan."

Second sub-hypothesis: "There is no statistically significant effect at the significance level ($\alpha \leq 0.05$) of the future vision dimension on the performance of projects in Jordan".

To verify the validity of the second sub-hypothesis, a simple linear regression was used to effect the future vision dimension on the performance of projects in Jordan, and the results as shown in figure (13):

The results indicate that there is a statistically significant effect of the future vision dimension on the performance of projects in Jordan, where the correlation coefficient ($R = 0.739$) indicates that there is a statistically significant correlation between the independent variable (future vision) and the dependent variable (project performance). The value of the determination coefficient ($R^2 = 0.546$), which indicates that (future vision) explained 54.6% of the variation in (project performance), while the remainder is due to other variables that were not included in the model, and the value ($F = 599.778$) at a confidence level equal to ($\text{sig} = 0.00$), and this confirms the significance of the regression at the level of significance ($\alpha \leq 0.05$). Third sub-hypothesis: To verify the validity of the third sub-hypothesis, a simple linear regression was used for the effect of the intelligent opportunism dimension on the performance of projects in Jordan, and the results were as follows:

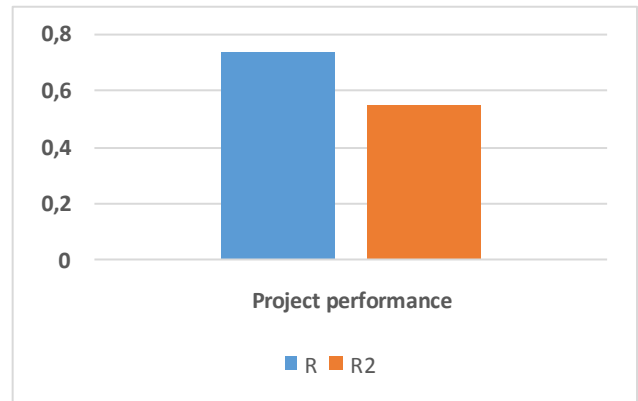


Figure (13): The results of a simple linear regression of the impact of the future vision



Figure (14): The results of a simple linear regression of the impact of the intelligent opportunism

The results indicate that there is a statistically significant effect of the intelligent opportunism dimension on the performance of projects in Jordan, where the correlation coefficient ($R=0.817$) indicates that there is a statistically significant correlation between the independent variable (intelligent opportunism) and the dependent variable (project performance). The value of the coefficient of determination ($R^2 = 0.668$), which indicates that (intelligent opportunism) explained 66.8% of the variation in (project performance), while the remainder is due to other variables that were not included in the model, and the value ($F = 1002.993$) at a confidence level equal to ($\text{sig} = 0.00$), and this confirms the significance of the regression at a significance level of ($\alpha \leq 0.05$).

Summary of The Main Results: The summary of main results of this work (The dependent variables) can be shown in figure (15).

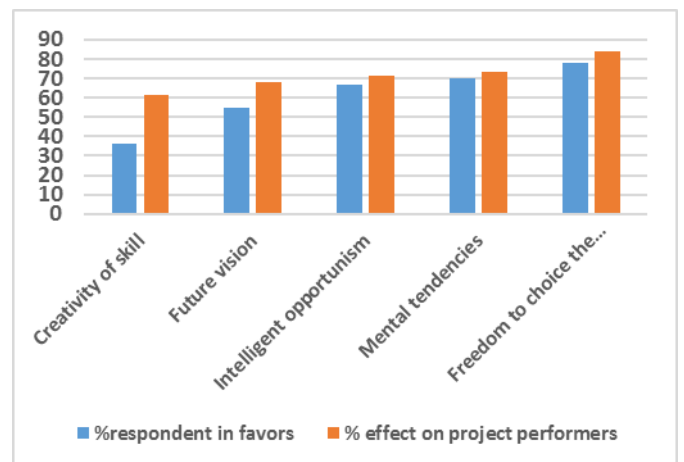


Figure (15): Summary of the main results (dependent variables) of this study

Conclusions:

From the above of the results of this discussion of this work, the following main points can be concluded.

- Creativity and skill parameters of the brain thinking preference has an effect of 61.3% on engineering project performance with 36.6% of respondent's agreement and with (VIF) of 2.097% indicating low correlation between variables.
- Future vision parameter of the brain thinking preference has an effect of 68.3%, with 54.6% of respondent's agreement, indicating good impact.
- Intelligent opportunism parameter of the brain thinking preference has an effect of 71.4%, with 66.8% of respondent's agreement, indicating a high impact.
- Mental tendencies parameter of the brain thinking preference has an effect of 73.1%, with 70.3% of respondent's agreement, indicating a high impact
- The freedom to choose a job affected has an effect on Project performance by 84.3%, and 78.2% of the respondents agreed that this measure of their mental thinking raises their project performance.
- The overall effects of the five criteria's according to the multiple regression test of these criteria (creativity and skill, future vision, smart opportunism, mental inclinations, freedom to choose a job) are 84.4% on the engineering project's performance (efficiency of employees, employees effectiveness, loyalty of employees, project quality).

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