

Relating Left/Right Brained Dominance Types of Leaders to TQM Focus: A Preliminary Study

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Abstract: *In this paper we relate left/right brain dominance types of leaders to TQM focus. Literature on TQM shows two distinct achievable results: continuous improvement and innovation. We hypothesize that left brained leaders emphasize continuous improvement; and right brained leaders focus on innovation. A pilot study of 111 Indian firms lent good support to our hypotheses.*

Keywords— *TQM leadership, left brained leaders, right brained leaders, continuous improvement, innovation.*

I. INTRODUCTION

Human beings are the only mammals whose left and right brains are specialized for quite different functions [1]. Both the left and right hemispheres of the brain have been found to have their own specialized forms of intellect so, here we consider the right and left brained thinkers. The Herrmann [2,3] Brain Dominance Instrument (HBDI) teaches how left brained thinkers are different from right brained thinkers and they give the different thinking techniques to get better results in their mission critical areas [4]. The thinking style of the leaders and theory of the structure and functions of the mind suggests that the two different sides (left and right side) of the brain control two different "modes" of thinking. There is need of strong leadership that can help to the success of any organization [53]. So, we consider right and left brained TQM leaders get catch up in their work preferences and find their appropriateness with continuous improvement and innovation in this study. In addition, today's competition, continuous improvement and innovation [5] need considerable attention as having that a crucial role in securing sustainable competitive advantage and many researchers have concluded them for long term survival of the organizations [6,7].

Continuous improvement is the ongoing process to remedy the work flow for the betterment of the organizations. Moreover, leaders are taking action to attain continuous improvement by small changes as improve to TQM rather than radical changes. Team members work in a team as a part of continuous improvement effort. There are different steps in continuous improvement where team members examine each step to determine when the bottlenecks occur then reduce the defects and improve customer satisfaction. The objective of TQM is to achieve continuous improvement. It is not enough to improve the quality of ideas so required innovation techniques is applied in TQM to reduce the complaint rate or defects rate and it generates innovative ideas to develop the competitive excellence.

Tushman and Nadler [8] assert: In today's business environment, there is no executive task more vital and demanding than the sustained management of innovation and change; to compete in this ever-changing environment, companies must create new products, services, and processes; to dominate they must adopt innovation as a way of corporate life. The drives of every company to sustain all other companies and competitors has accelerated both employees and organizations to continuously search for new ideas, new processes of work, products and services, and new strategies in order to adapt, survive and grow in the rapidly changing business environment [9]. So, TQM provides a necessary platform to develop the competitive excellence through continuous improvement and innovation. For the achievement of continuous improvement and innovation, the role of leadership, management commitment, knowledge, measures, resources, and focused actions are important in TQM practices. In this paper, we explore the characteristics of right and left brained TQM leaders who have their different approaches and support to TQM in terms of support, strategic planning and decision making and try to relate them to continuous improvement and innovation.

In this paper section 2 gives a brief review of the literature related to this research and section 3 relates hypothesis development with past literature. Section 4 outlines the research methodology, followed by result and analysis in section 5. Section 6 briefly outlines the conclusions.

II. LITERATURE REVIEW

According to the theory of TQM, success is measured in terms five parameters namely effectiveness, efficiency, productivity, quality, and non-quality related measures such as defects, error rates, cost of poor quality and deliveries not on time etc. [10]. Adding on this, TQM is, as Easton and Jarrell [11] maintain, a comprehensive organizational management system which is based upon the integration of several managerial perspectives, approaches and theories into one, in acknowledgement of the complexity of organizational structures themselves. TQM, insofar as it is predicated upon strategic management, well- defined decision-making model, project management and performance measurement, embraces the tools particular to each of the stated [12]. In total quality management leader as a person who inspires, by appropriate means, sufficient competence to influence a group of individuals to become willing followers in the achievement of organizational goals [13].

A. RIGHT AND LEFT BRAINED LEADERS:

Both the left and right cerebral hemispheres have distinctive roles and play important, though different roles in functional parts of the body. The four quadrants describe different processing modes that we all have access that represent preferred mental processes like upper left, lower left, upper right, and lower right. The left brain might contain an extensive number of neural tracts and structures associated [34]. Overall, the results of these studies suggest that the left brain is involved more heavily with the phonological (or verbalized) [34]. In other words, the left brain became the seat of self-motivated behavior, sometimes called top-down control. The left side of the brained leaders are responsible for rational, logical, and abstract cognition and conscious knowledge [35]. Neuroscientists such as Allan Schore [36] has suggested that activities associated with the left brain currently dominate mental health services. A “left-brain world” would lead to increased bureaucracy, a focus on quantity and efficiency over quality, and a valuing of technology over human interaction, and uniformity over individualization [35]. We consider only left and right brained characteristics. The characteristics of the left brain are judgmental thinking, tactical planning, and organization, data analysis, financial budgets, and calculations, sequential, controlled, routine, persistent thinking concerned with administration, safekeeping, maintaining the status quo, detail [2, 3].

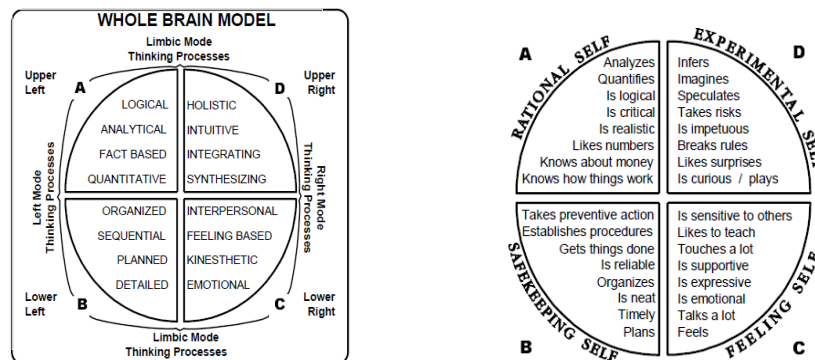


Figure 1: Source: the Creative Brain: “Creativity and Strategic Thinking- The Coming Competencies”, Herrmann [2, 3]

From that simple beginning, we propose, the right brain took primary control in potentially dangerous circumstances that called for a rapid reaction, for instance [33] and it became the seat of environmentally motivated behavior, or bottom-up control [33]. Certain nonverbal functions have been found to be handled largely by the right brain [34]. The right side of the brain is associated with unconscious social and emotional learning, and includes intuition, empathy, creativity, and flexibility [35]. The characteristics of the right brain are creative thinking, people intuitive, symbolic, value-based thinking concerned with communications, training, imaginative, special, metaphorical, flexible, idea-intuitive, playful, concerned with possibilities, dreams, visions, and synthesis, strategic planning, change, innovation, and entrepreneurship [2, 3].

B. CONTINUOUS IMPROVEMENT

Continuous improvement method is famous from Imai's [14] book *Kaizen: The Key to Japan's Competitive Success*. This method is known as Kaizen which means (kai means "change" and zen means "good") improve without abruptly. Continuous improvement method has become famous TQM objective of primary importance. It begins with an understanding of where we are and where we want to be. It is the process of TQM that we can't say that it is achievable within a particular time but it is the journey that never ends. Bound [15] indicated that continuous improvement is a program to reduce order processing times, service development cycle-time, service delivery cycle times as well as reducing paper work and to find wasted time and cost in all the internal processes. Further Bounds [15] stressed that TQM teaches managers to engage in root cause analysis. David [16] said that continuous improvement does not mean only repeated small improvement along with improvement of any size.

Elliott [17] identified the model that represent the accomplishment of each task is critical to the overall the TQM implementation through continuous improvement and marketing department of the organization, should complete in adapting TQM approach to continuous quality improvement. The objective of the TQM programs is to improve an organization's ability to deliver high-quality products or services in a cost-effective manner and continuous improvement initiatives are the mechanisms used accomplish this objective [18].

C. INNOVATION

Majaro [19] looks at innovation as a process where ideas are generated and transformed for implementation to business products and services. In the modern complex business world, innovation has become the basis for creating and sustaining competitiveness [20] which also shows that the integration at TQM and innovation is possible by using an evolutionary process to develop business excellence. In order to avoid failure, the organizations always try to achieve better innovation [21] business success, improve business performance and foster competitiveness; and many organizations worldwide have adopted TQM principles [22].

To understand the current scenario, more related studies are needed in the future and find those factors that contribute to improved innovation performances [23]. Since the relationship between quality management and innovation is rather controversial, the study concentrated on those quality management practices that are potentially more supportive of innovation [24]. He further explained that many organizations always try to get the competitive advantage in the markets through technical innovation (process and product innovation) and make a strong relationship with quality management.

TABLE 1: FEATURES OF CONTINUOUS IMPROVEMENT AND INNOVATION [14]

SN		Continuous Improvement	Innovation
1	Effect	Long-term and long-lasting, but undramatic	Short-term, but dramatic
2	Pace	Small steps	Big steps
3	Time frame	Continuous and incremental	Intermittent and non-incremental
4	Change	Gradual and constant	Abrupt and volatile
5	Involvement	Everybody	Select few "champions"
6	Approach	Collectivism, group efforts, systems approach	Rugged individualism, individual ideas and efforts
7	Mode	Maintenance and improvement	Scrap and rebuild
8	Spark	Conventional know-how and state of the art	Technological breakthroughs, new inventions, new theories
9	Practical requirements	Requires little investment, but great effort to maintain it	Requires large investment, but little effort to maintain it
10	Effort orientation	People	Technology
11	Evaluation criteria	Process and efforts for better results	Results for profits
12	Advantage	Works well in slow-growth economy	Better suited to fast-growth economy

III. HYPOTHESIS DEVELOPMENT

This research framework is developed in accordance with the literature review. In the global market place, today's market scenario is very competitive among the organizations so producers focus on competitive advantage and organization competencies. They develop their product quality and creative & innovative idea for sustainability of the organization. The role of leaders is to implement TQM through planning, controlling, organizing, motivating, and managing resources of the organization. From the review, it is perceived that the need of appropriate leaders for continuous improvement and innovation. The figure below describes research framework for this paper.

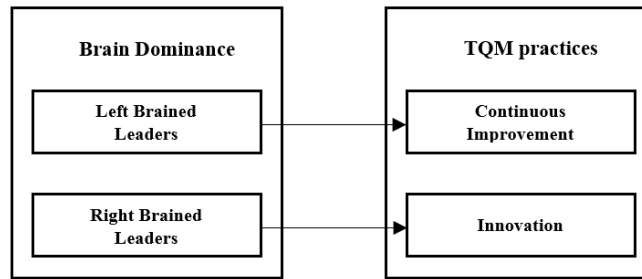


Figure 2: Hypothesized Model: Relationship of left and right brained leaders with continuous improvement and innovation

The theory of the structure and functions of the mind suggests that the two different sides of the brain control two different "modes" of thinking. The Left-Brain is associated with analytical and rational thought; which is logical, sequential and objective. It looks at parts instead of the whole. The Right-Brain is associated with the intuitive and synthetic; which is random, holistic and subjective. Our modern-day approach to strategic thinking and acting is typically Left-Brain while our ancestors' approach is Right-Brain. A more intuitive perspective of human nature and interaction is necessary to conceive and apply effective strategy. Planning by definition involves analysis and planners must articulate clearly and be precise. Plans must be delivered on schedule. Incremental improvements tend to emphasize starting with factual information who are left-brain thinkers, whilst breakthrough and radical thinking both start with intuitive insights who are right-brain thinkers, a process which is then followed by factual verification [5,25]. The left is highly verbal and mathematical, performing with analytic, symbolic, computerlike, sequential logic. The right brain, by contrast, is spatial and mute, performing with a synthetic spatio-perceptual and mechanical kind of information processing that cannot yet be simulated by computers [1].

Left brained leaders:

In the left hemisphere of most leader's brains, the logical thinking processes are found [37] and focused on short term result and profit. The left hemisphere controls movements on the body's right side [37]. In business term, the characteristics of left brain are logical, objective, verbal, judgmental thinking, practical, controlled, routine, persistent thinking; and concerned with administration, marketing, advertisement and business development [2, 3, 37]. The left hemisphere appeared to be dominant for mental, intellectual and analytical tasks [38] and the techniques of brain's left hemisphere are tactical planning; sequential and systematic; articulated is linear; it processes information sequentially, follow one bit after another or in order way or step by step (continuous) processes [37].

For example: probably most lawyers, accountants, and analysts have better developed left-hemispheric thinking processes [37]. This type of leaders have their different strategy for decision and policy making processes; who usually explain their decisions under supervision largely in terms of conscious processes as analytical, logical, and intellectual. They are systematic strategic planners and bottom to top policy makers and they may dominate lower down [37].

Leadership is an essential factor for the success of TQM. The leadership of the management acts as a driving force in the implementation, development and improvement of TQM [46]. McFadden et al. [47] show the need of leadership for safety climate and continuous quality improvement to effectively enhance process quality produces greater combined benefits. Other corporate goals are to increase flexibility in meeting new competitive conditions and to create frameworks that will enable them to continuously improve their business performance [48]. Competent leaders do not simply respond to change, but proactively recognize when change is necessary [48]. In addition, leaders understand the change management process, and foster an environment of agility, learning, and strategic anticipation [48]. Customer focus, continuous improvement, employee involvement, and supplier quality management are significantly related to product quality in the context of high leadership competencies [48]. The findings point to the argument that while all the TQM principles could be executed better at higher levels of leadership competencies, only a better execution of customer focus, continuous improvement [48]. Competent leaders focus on continual quality improvement [52], get results, and manage strategy to action by stressing the importance of achievement and mastery motives, and motivate/influence others without authority to extend one's performance capabilities and empower them to do their best [51].

Right brained leaders:

In the right hemisphere seemed to be preferentially involved in spatial and constructional concepts [38]. The right hemisphere controls movements on the left. In sharp contrast, the right hemisphere is specialized for simultaneous processing, systematic, well-ordered, more relational, holistic processes [37] and this type of leaders follow gestalt strategy (creative and integrated

strategy) [37]. In business term, the characteristics of right brain are long term vision and intuition orientation, ambiguity, good judgmental decisions, synthesize, creative thinking, value-based thinking [2,3,37]. Moreover, these leaders also imaginative, special, flexible, idea-intuitive, and concerned with possibilities, strategic planning, change, innovation, and entrepreneurship [2,3,37]. In particular, greater use should be made of the powerful new skill-development techniques which are experiential and creative in nature [37]. A lot of idea generation and has to be activated, to take decision in any particular matter, by creating many alternatives. Ideas are generated in a short time, and are more creative, more developed have more innovation and intelligence. For instance, a small group gathers around a table and receives inspection, the problem is identified, participants think silently, write down ideas about the problem solving. Each idea is discussed, clarified and evaluated by the group member, each group secretly ranks the ideas as per their order, and highest rank is taken by the group decisions [2,3,37].

For example artists, sculptors, and perhaps politicians; they have better developed right-hemispheric processes. This type of leaders have their different strategy for decision and policy making processes; who usually explain their own decisions largely in terms of subconscious processes such as 'intuition' and 'judgment', unanimously agree, and even emphasize, that extra rational processes play a positive and essential role in policymaking [39]. They are with "top-down" policy-making systems be more important at the top of an organization.

The innovation leaders need to show a special kind of leadership [40,41]. This leadership must be balanced, people-oriented and must include a high tolerance for ambiguity and paradoxes [40]. The first aspect concerns the content of the leadership in innovation with new product, a new technology or a new market; the group dynamics of the innovation team; and the innovation process as a creative process [40]. They have to be nice and nasty at the same time. In short, innovation leaders should be some kind of controlled schizophrenics [40]. In addition, behaviors of leaders in the two broad stages of innovation, i.e. very different personality and leadership styles to preside over the front end innovation from idea to concept, where creativity and risk taking are vital compared with speedy back end from concept to launch which required [41].

Effective leadership is essential for technological innovation [42]. Technological competence is an utmost prerequisite for effective leadership for construction innovation. Innovations leaders always tend to see opportunities in new technologies; recognize that innovation strategies must evolve; manage trade-offs; and focus on routine and breakthrough innovations [43]. Moreover, leaders can orchestrate complex system. They must take prime responsibility for the processes, structures, talent, and behaviors that shape how an organization searches for innovation opportunities, synthesize ideas into concepts and products designs, and selects what to do [43].

Leaders create a new environment in the organization by their inter-personal relationships and influences that involve others in the change initiative. Some authors in the TQM literature pointed out that leaders are able to influence the feeling of their followers to provoke creativity, develop integrated teams, define and communicate a shared vision, and generate compromise [49, 50]. Finally, the two measures of leadership style: use of consultation and provision of freedom, showed moderate relationships to innovation [44]. An innovation score for each group was computed by averaging the (adjusted) innovation scores of its members [44]. Innovation leaders play different roles in performing their jobs as strategic planner, team builder, and technical expert [45]. The leaders must change their relative role emphasis as their team evolves along time [45]. They must be patient to see any performance feedback of the leadership activities, because it usually takes a considerable time for their efforts to show measurable effects [45]. Require more activity in processing and creating scientific, technical, and market knowledge [45]. On the basis of above explanation we suggested following two hypotheses:

H₁: Left brained leaders are suited to achieve continuous improvement in the context of TQM practices.

H₂: Right brained leaders are suited for innovative results in the context of TQM practices.

IV. RESEARCH METHODOLOGY

DATA COLLECTION AND MEASUREMENT SCALE:

In this section, we discuss data collection and measurement of all variables used in the study as well as the statistical tests used to evaluate the hypotheses. The study is questionnaire based and most of the responses was collected online. Data collection was done in two phases; first questionnaire on basic questions on TQM practices for companies who focus on TQM implementation. In the second phase, the questionnaire contains the brain dominance questions along with continuous improvement and innovation. The data was collected from employees of various department of Indian firms. A heterogeneous group of companies from the following industries were part of the survey viz. automobile manufacturing, power sector, electronic and computer components, machinery and computer equipment and components, electronic and electrical equipment and components, chemical and allied products, information technology, pharmaceutical products textile products manufacturer, cement, paper & rubber products, oil processing & coke, leather manufacturer, agricultural by-products, crafts products, refinery, food and beverage products, paint products, and personal care products. Around 80% respondents were from different manufacturing firms so we focus on mostly manufacturing firms in this study. In this study,

we consider the people who are working or have worked as quality employee or have some experience about quality in quality department along with quality managers. Total of 348 questionnaires were distributed. 26 questionnaires were rejected due to largely missing values. We consider Total of 322 questionnaires out of which 111 were returned showing response rate of 34%. For respondents, 91% male, rest 9% female and average age was 29 years. From these 111 responses, we calculate 54 left brained leader’s side and 57 right brained leaders.

VARIABLE MEASUREMENT

For testing the hypotheses we used the SPSS 21.

Independent variable: A total of 25 items captured the two independent variables under investigation of left and right brain thinkers. The questionnaires on Brain dominance and thinking styles inventory has set of four statements A, B, C, and D which demonstrate four parts of the brain: upper left, upper right, lower left, and lower right but it has been considered only left & right part of the brain and these two types of brained leaders in this study. So, two of these four in terms of preferred response indicate left and rest two indicate right brain thinkers which grouped into two variables. The constructs were measured by frequency distribution and find who is left/right brain thinker. This brain dominance and thinking styles inventory is adopted from different literature which described below. Here, these two thinkers are independent variables which are considered as grouping variables.

Dependent variable: A total of 13 items captured two dependent variables namely continuous improvement (CI) and innovation (IN) and these construct were measured by five-item scale adopted from different literature which described below. These items were worded and assessed on 5 point Likert scale from 1 to 5 with “1” representing strongly disagree “5” representing strongly agree.

TABLE 2: SUMMARY OF CONSTRUCTS AND REFERENCES

SN	Constructs	References
1	Left brain thinkers	Herrmann [2,3]; Mintzberg, H. [37]
2	Right brain thinkers	Herrmann [2,3]; Mintzberg, H. [37]
3	Continuous improvement (CI)	David [16]; Bounds [15]; Elliott [17]; Lam, et al. [18]
4	Innovation (IN)	Majaro [19]; Kanji [20]; Pinho [22]; Trivellas [21]; Long [23]; Kafetzopoulos et al. [24]

INDEPENDENT SAMPLE T-TEST:

Independent sample t-test was used to test the hypotheses. It is generally used to test the null hypothesis and evaluates the difference between the means of two population. In the independent sample t-test, there are two variables, the grouping (independent) variable and the test (dependent) variable. Here, the grouping variable divides into two mutual exclusive groups, such as left and right brained leaders, whilst the test variable describe as quantitative dimensions continuous improvement and innovation. Before going to test whether hypotheses support or not, we identified grouping variables (54 left brained leaders and 57 right brained leaders). Herrmann [2, 3] described left and right brained thinkers which are measured by twenty five questions. We extracted these questions from this literature and Herrmann [2, 3] mentioned answers for these questions in his research which clearly indicate that appropriate brain side thinking styles. We have asked these questions directly to the respondents/leaders and after getting responses, measured it by frequency distribution and identified their strongest thinking styles.

The t-test describes the mean value of continuous improvement for grouping variable left brained leaders is significantly differs from the mean value of continuous improvement for grouping variable for right brained leaders. On the other hand, t-test describes the mean value of innovation for left brained leaders is significantly differs from the mean value of innovation for right brained leaders. The null hypothesis for an independent sample t-test that the population means of the two samples are equal ($\mu_L = \mu_R$) and for alternate hypothesis, the population means of the two samples are not equal ($\mu_L \neq \mu_R$) where μ_L and μ_R are the means of the samples left and right brained leaders for H_1 and H_2 . Before that, the three assumptions and their verifications are given below.

ASSUMPTIONS OF INDEPENDENT SAMPLE T-TEST [26]:

1. The samples have an equal variance. Verified by Levene’s test.
2. The variable of the samples to be compared is assumed to have a normal distribution; Shapiro - Wilk test are performed.
3. The observation made on the sample members must all be independent of each other.

RELIABILITY ANALYSIS

A reliable measure is one which repeatedly measures the same phenomenon with accuracy. Cronbach alpha is by far the most popular measure of reliability [27-29]. It takes into account the effect of each item in estimating the overall reliability [30]. A measure is considered reliable if the Cronbach’s alpha value is greater than 0.7 [31-32]. This is the most accepted formula for

assessing the reliability of data. These values indicates that all constructs archiving internal consistency reliability. Thus, the measures employed in the study can be considered reliable is presented in table. Table 4, 5, 6, and 7 show the Reliability statistics, Levene’s test for equality of variance, Shapiro - Wilk test of normality, and Mann-Whitney U test.

TABLE 3: SUMMARY STATISTICS

Brain dominance and thinking styles inventory	Parameters	Hypothesis	
		H ₁	H ₂
Left Brained Leaders	Mean	3.774	3.034
	Variance	0.260	0.247
	Skewness	-0.228	-0.335
Right Brained Leaders	Mean	3.233	3.721
	Variance	0.195	0.379
	Skewness	-0.109	-0.262

TABLE 4: RELIABILITY STATISTICS

Variable	No. of items	Cronbach’s alpha (α)
Continuous improvement	6	0.724
Innovation	7	0.804

Levene’s test for equality of variances for assumption that the variance of the two groups, if the F-test is not significant (at the level of sig., p<0.05), the assumption is violated (here, in case of innovation), in this case, the equal variance id not assumed. The results of Levene’s test for equality of variance are given below in the table:

TABLE 5: LEVENE’S TEST FOR EQUALITY OF VARIANCE

Constructs	Levene’s Test for Equality of Variance		
	Levene’s statistic	Sig.	Var
CI	1.945	0.166	EV
IN	6.290	0.014*	UEV

CI = continuous improvement; IN = innovation, EV = Assuming Equal Variance, UEV = Assuming Unequal Variance, *p<0.05, **p<0.01.

The Shapiro - Wilk test was conducted to see if the data is normally distributed for left and right brained leaders. For the data to be normally distributed, the sig. value should be more than 0.05. If not so, the assumption of normality is violated. Here in case of right brained leaders, the assumption of normality is violated. So, need to perform a non-parametric test- the Mann-Whitney U test (also called Wilcoxon- Mann-Whitney test) that examines the difference between two independent samples on a continuous or ordinal dependent variable. The results of Shapiro - Wilk test are given below in the table:

TABLE 6: SHAPIRO - WILK TEST OF NORMALITY

Constructs	Left Brained Leaders (1)			Right Brained Leaders (2)		
	Statistic	df	Sig.	Statistic	df	Sig.
CI	.980	54	.493	.949	57	.017
IN	.963	54	.091	.950	57	.019

CI = continuous improvement; IN = innovation, *p<0.05, **p<0.01.

There is some violation in terms of normality and variance so, we performed a non-parametric test- the Mann-Whitney U test. This test is a non-parametric equivalent of the parametric independent t-test. Moreover we can say that it is an alternative independent t-test, used when the data is ordinal and non- parametric. It was run to determine if there were differences in scores of CI and IN. Median CI score was statistically sig. higher in left brained (3.8333) than in right brained (3.333), U = 637.5, z = -5.348, p = 0.000. Median IN score was statistically sig. higher in right brained (3.7143) than in left brained (3.1429), U = 615.5, z = -5.467, p = 0.000. The results of the Mann-Whitney U test are given below in the table:

TABLE 7: MANN-WHITNEY U TEST FOR CI AND IN

	Mann-Whitney U	Wilcoxon W	Z	Asymp. Sig. (2-tailed)
CI	637.500	2290.500	-5.348	0.00***
IN	615.500	2100.500	-5.467	0.00***

CI = continuous improvement; IN = innovation, *p<0.05, **p<0.01, ***p<0.001.

a. Grouping Variable: brain dominance and thinking styles inventory.

V. RESULT AND ANALYSIS

The null hypothesis in our both the cases is $\mu_L = \mu_R$ and alternate hypothesis is $\mu_L \neq \mu_R$, where μ_L and μ_R are the means of the samples left and right brained leaders for H_1 and H_2 . It has been hypothesized in H_1 and results revealed that left and right brained are two different things for continuous improvement, there is significant difference between left and right brained. On the basis of hypothesis H_2 and results revealed that left and right brained are two different things for innovation also and there will be significant difference between left and right brained. The sig. value is 0.00, it means we reject the null hypothesis.

TABLE 9: SUMMARY OF RESULTS AND HYPOTHESES TESTING

Hypotheses	Hypothesis	Result
H_1	Left brain leaders for Continuous Improvement	Supported
H_2	Right brain leaders for Innovation	Supported

The result of table 3 shows that $\mu_L > \mu_R$ is for continuous improvement and $\mu_L < \mu_R$ for innovation, it means the mean of left brained leaders is more than right brained leaders for continuous improvement and the mean of right brained leaders is more than left brained leaders for innovation. All the hypotheses were accepted that indicated that right brained leaders are suited for innovative results and left brained leaders will achieve continuous improvement. Prajogo & Sohal [5] and Miller [25] stated that incremental improvements tend to emphasize left-brain thinkers, whilst breakthrough and radical thinking are right-brain thinkers. So far, there is no literature which has considered the effect of left and right brained leaders on continuous improvement and innovation in case of TQM practices but here, our results support the results to our hypotheses.

VI. CONCLUSION

Proceeding from the above explanation, it is evident that TQM theory is the benchmarks of effective leadership to TQM implementation and there is required good leaders for continuous improvement and innovation. Effective leaders (left and right brain thinkers) can maximize the importance for strategic planning, decision making through appropriate decisions and he has important role in quality improvement in an organization. It is evident that it avoid the mismatch of the functions of left and right brained leaders with their functions in the organization.

The proposed model focuses on the relationship between brain dominance types of leaders to continuous improvement and innovation; affirmed the hypotheses with real life data. The findings obtained from this study, are assign the functions of left and right brained leaders. The result shows that the right brained leaders emphasize innovation and managing; while left brained leaders focus on continuous improvement and planning; that good support to our hypotheses. For all of this to be achieved the most important thing continuous improvement and innovation for the TQM leaders; are essential for the today's rapidly changing market.

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