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ADAPTATION AND RE-STANDARDIZATION OF PSYCAT PRO A MULTI-DIMENSIONAL MEASURE OF HUMAN PSYCHOMETRICS

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Abstract: The present research study was conducted for the adaptation and re-standardization of PSYCAT PRO, a multidimensional measure of human psychometrics that quantifies and infers the levels of patience, planning, emotional status, tactful behavior, attitude, social sense, attitude, obsessive behavior and intellectual levels of individuals. The adaptation of psychological instruments is a complex process that requires a high methodological standard. Test adaptation is a descriptive of the process that usually takes place in terms of revising, adapting and formatting. It is a practice which is judged as an important one for conducting and evaluating the adaptation of psychological and educational tests. Aspects regarding the factorial structure of the questionnaire evaluated through statistical procedures such as exploratory factor analysis were considered. The empirical evidence such as reliability, item analysis, and validity were also duly taken into consideration. The new version of PSYCAT is found to be equally and statistically valid for a wide range of population including professionals as well as students above the age of 18 years.

Index Terms - Adaptation, psychometrics, reliability, revision, validity.

I. INTRODUCTION

PSYCAT PRO is an assessment intended to diagnose the levels of patience, planning, emotional status, attitude, social sense and intellectual development among individuals. While framing this assessment, the sample was collected from a closed group which included teachers, corporates and individuals. However, in the present study it was intended to expand the utility of this assessment for a wider range of population. To make it applicable for all professionals and students above the age of 18 years, this time the sample was taken accordingly. Assessment consisted of parts and sub- parts as it was mandatory to analyse each part individually as well as collectively to find its suitability for the wider population. The process of adapting an existing instrument, rather than developing a new one meant specifically for the target population, has considerable advantages. By adapting an instrument, it becomes possible to compare data from different samples and from different backgrounds, which enables greater fairness in the evaluation because the same instrument assesses the construct based on the same theoretical and methodological perspectives. The use of adapted instruments enables a greater ability to generalize and also enables to investigate differences within an increasingly diverse and wide range of population. The importance of reliable assessments had been well explained by Rulon (1939) who simplified the procedure for determining the reliability of a test efficiently. In corroboration, Mukharji (1966) explained and followed the process of construction and standardization of assessments. Likewise, Popham and Husek (1969) conducted a study and found the implications of criterion referenced measurement. On the same lines, Schag et. al (1984) explained the reliability, validity, and guidelines. Sharma (1984) studied the performance on ability and aptitude tests and assessments. Haladyna and Downing (1989) studied the taxonomy of multiple choice item writing rules and evaluated their significance well endorsed in the present assessment. Blinkhorn and Johnson (1990) also studied the role of personality testing. Endorsing the similar concept, Haynes et. al (1995) studied the content validity in psychological assessment as a functional approach to concepts and methods. Cohen et. al (1996) conducted a research on the psychological testing and assessment. Haladyna et. Al (2002) further carried a review of multiple choice item writing guidelines for assessments. Kim et. al (2003) found the significance of standardization, reliability and validity in assessments. Garrelt (1985) studied the statistics in psychology and education. Cronbach and Shavelson (2004) emphasized the educational and psychological measurement. Carson et. al (2005) studied the reliability, validity and factor structure of the creative achievement questionnaire. In the same year, Rodriguez (2005) studied and found the importance of multiple choice items in the assessments. Bush (2007) has well emphasized the authenticity in research via reliability, validity and triangulation. Kothari (2009) studied and verified the impact of research methodology, methods and techniques to follow in various situations. Maris et. al (2012) traced the speed accuracy and response models for scoring rules based on response time and accuracy that can be well utilized in the online assessments. Haladyna and Rodriguez (2013) threw light on developing and validating test items. Kane (2013) studied and found the significance of validating the interpretations and uses of test scores. Marwaha (2017) has developed an assessment based on

psychometric and cognitive abilities titled PSYCAT which has been updated into PSYCAT PRO after re-standardization. Zhang, et. al (2020) conducted a research study and found the reliability, validity, and factor structure. Taking the reference of the recent studies, Cosentino et. al (2021) emphasized the psychometric properties of the inventory of personality organization. Fisher et. al (2021) carried a critical examination of content validity, evidence and personality testing for employee selection. Hough and Oswald (2021) traced personality determinants of employee engagement. Maxwell et. al (2021) studied the organizational context of development and preliminary psychometric evaluation. Neto et. al (2021) studied the adaptation and psychometric validation of a questionnaire about organizational safety culture and climate. Similarly, Powell et. al (2021) reviewed and traced the measures of organizational culture, organizational climate, and implementation climate in behavioral health. Rosa (2021) also studied the concept of accelerating innovation and protecting organizations. Supratman et. al (2021) studied the relationship of charismatic leadership, employee personality, and employee performance. Zaidi (2021) evaluated the effect of personality characteristics on workplace ostracism emphasizing the impact of employee popularity and emotional intelligence. These studies further strengthen the assumptions and adaptation of the instrument in hand. Adaptations refer to the process of adjusting an instrument to a new cultural context, which usually goes beyond close translations and involves various changes to the instrument in order to increase its cultural and linguistic adequacy. There are conceptual, cultural, linguistic, and measurement reasons for adjusting an instrument. A good adaptation integrates all these types. Test adaptations have largely replaced the concept of test translations and that test adaptations can be used in large-scale surveys and can accommodate instruments that cover both universal and local components. Instrument revision and the retesting of revised instrument have been done successfully in the past as well. In case of the present instrument, It was important to revalidate the assessment so that it could be used for the target population in the expanded form. Revalidation is a process which is used to establish the continuing competence for practice of an assessment or tool in an ethical and professional way. It helps in improving the quality of the tool which is being used. Before using an assessment on a population, it is important to test its standards and norms so that the results are valid and reliable. It is inevitable that the psychometric tests require frequent and extensive revision than other tests. Equally important is to test reliability and validity of a redesigned theoretical instrument through empirical research. When these empirical evidences are collaborated with theoretical research, the procedure becomes more rational and the strategy is extensively logical. Testing for the measurement and procedures are followed for redesigning and revalidating a tool. It is the responsibility of the team to develop generally agreed upon guiding philosophy for the test revision while initiating the project and to incorporate the changes that are likely to be required to make the test purposeful. Although it is a time consuming process but it is very important to keep pace with the norms and make the required changes in the test if its utility is being shifted from one population to another or even if there is a need of expansion of the target population. The updated version of the assessment provides space for the comprehensive evaluation and explains the characters exhaustively with qualitative as well as quantitative narration. Relevance to the population and the recent developments were considered while updating and revising this assessment.

II. METHODOLOGY

The adaptation of PSYCAT intended to make it applicable for a wider range of population. The present research study was conducted with an intention to review an already standardized test and assessment to make sure that it is applicable for winder range of population. This study was carried in context with PSYCAT. It was ensured that the amount of overlap in the definition and the content of construct measured by the test and item content in the population of interest was taken into account and was evaluated appropriately. It was found to be sufficient for the intended use. It was ascertained to minimize the influences of any cultural differences th. It was relevant to the intended use of the test in the population of interest. Along with that it was established that the new items in the questionnaire contained the language and the vocabulary used in generic by the population of interest. Content adequacy assessment was done following which the questionnaire administration was carried onto the sample. Item Scaling, factor analysis, internal consistency assessment and construct validation was carried. Experts of psychology, cognition and education examined these 28 items that finally were included to replace the older items. Results notified that the 'test and assessment' is reliable and valid tool in measuring psychometrics, specifically the levels of patience, planning, emotional status, tactful behavior, attitude, social intelligence, attitudes, obsessive behavior and intellectual levels. Construct validity was administered and the correlation was found to be positive. Appropriate procedures were marked to maximize the suitability of the test adaptation in the intended populations. It was ensured that the test instructions and item content have similar meaning for all intended populations. Further, it was proven that the item formats, rating scales, scoring rubrics, test conventions, modes of administration, and other procedures are suitable for all intended populations. The pilot data was collected on the adapted test to enable item analysis and reliability of the assessment, to be carried out for the necessary revisions to the adapted test. The sample was selected with characteristics that were relevant for the intended use of the test and of sufficient size and relevance for the empirical analyses. The relevant statistical evidence was provided about the construct equivalence, method equivalence, and item equivalence for all the intended populations. The evidence was compiled supporting norms, reliability and validity of the adapted version of the test in the intended populations. Appropriate equating design and data analysis procedures were followed when linking score scales from the versions of test. Administration materials and instructions were prepared to minimize any culture related concerns that might be caused by administration procedures and response modes that might affect the validity of the inferences drawn from the scores. Testing conditions were followed closely in all populations of interest. Group score differences were interpreted with reference to all relevant available information. Scores across populations were verified once the level of invariance was established on the scale on which scores were reported. Technical documentation related to any changes was provided, including an account of the evidence obtained to support equivalence, when the test was adapted for extended use in another population. Documentation for test users was prepared that supported good practice in the use of an adapted test with people in the context of the new population. Eventually, a review form was designed that included only questions for which there was evidence that the questions in the review form linked to features of test items that could have an impact on item performance in terms of the item format, including physical layout in the two versions. It was also considered that the terms and the intent had been suitably adapted to the cultural environment in the adapted version. Each of the item replaced was written to address flaws found in empirical analysis. Once the new items were included in the test, the internal validity was measured. The internal validity of the test is the extent to which it measures what it is supposed to measure so it was important that even after changing the items the intent of this changed items should not change. The external validity of the test is referred to as how well it can be generalized to a population for which it is being developed. Although test in the pilot study is conducted on a sample representative of the population, still it is at most important to ensure the generalized results to the entire population. Both these aspects were taken into consideration while revising. Besides, there are three additional criteria of types of evidence for test validity including. Construct validity refers to the association of test with an underline theory and it also confirms that the test produces a result that is in accord with the already existing and established theory. Content validity referred to as face validity which notifies that the test seems to measure what it is supposed to measure and that its content makes sense. Criterion validity portrays that the test results match up with other known measures of characteristics. There are two types of criterion validity: concurrent and predictive. Concurrent validity explains that when a test result is compared with another established indicator at the same time, and if both scales give the same result, then the newer one possesses criterion validity. It is valid because it gives the same result as a known criterion which is already standardized. The process involved segregation of questions based upon applicability on the targeted population. Selected questions remained as such whereas to replace the questions having given a minute scope of replacement, a pool of questions was developed. This pool of question was developed for each of the parameter included in the assessment. To initiate the process of revision and development expert advice was taken and implemented to initiate the process effectively. The developed pool was extensive and included all the questions so as to get the valid and reliable results. It was important to check the reliability and validity of the selected questions to be included in the assessment. To make it even more authentic it was important to reverse the process. In one set of the questionnaire, both the replaced and new questions were added and given to the sample. In the second set, only the new questions were given whereas in the third set, only the old questions were given. In the next phase of revising, statistical tools were used to find the reliability and validity of the questions. Out of these new questions the questions found reliable and valid were kept and the rest were discarded. Once the new questions replaced the older version, compiled and full test was given to the sample. The data was collected analysed.

Table: 1 Value of Item Correlation

Item No	Value	Item-42	0.88	Item-82	0.91	Item-122	0.86
Item-1	0.89	Item-41	0.79	Item-81	0.91	Item-121	0.79
Item-2	0.79	Item-42	0.88	Item-82	0.91	Item-122	0.86
Item-3	0.8	Item-43	0.87	Item-83	0.76	Item-123	0.78
Item-4	0.74	Item-44	0.88	Item-84	0.87	Item-124	0.76
Item-5	0.74	Item-45	0.87	Item-85	0.79	Item-125	0.77
Item-6	0.82	Item-46	0.87	Item-86	0.84	Item-126	0.88
Item-7	0.86	Item-47	0.83	Item-87	0.89	Item-127	0.84
Item-8	0.78	Item-48	0.75	Item-88	0.87	Item-128	0.9
Item-9	0.85	Item-49	0.77	Item-89	0.76	Item-129	0.91
Item-10	0.78	Item-50	0.86	Item-90	0.89	Item-130	0.81
Item-11	0.75	Item-51	0.82	Item-91	0.84	Item-131	0.86
Item-12	0.82	Item-52	0.8	Item-92	0.74	Item-132	0.8
Item-13	0.74	Item-53	0.78	Item-93	0.8	Item-133	0.83
Item-14	0.77	Item-54	0.87	Item-94	0.77	Item-134	0.8
Item-15	0.78	Item-55	0.77	Item-95	0.89	Item-135	0.91
Item-16	0.86	Item-56	0.82	Item-96	0.81	Item-136	0.74
Item-17	0.87	Item-57	0.74	Item-97	0.79	Item-137	0.86
Item-18	0.79	Item-58	0.78	Item-98	0.89	Item-138	0.79
Item-19	0.8	Item-59	0.76	Item-99	0.78	Item-139	0.76
Item-20	0.91	Item-60	0.76	Item-100	0.84	Item-140	0.74
Item-21	0.83	Item-61	0.77	Item-101	0.84	Item-141	0.76
Item-22	0.77	Item-62	0.78	Item-102	0.9	Item-142	0.91
Item-23	0.87	Item-63	0.81	Item-103	0.91	Item-143	0.84
Item-24	0.89	Item-64	0.74	Item-104	0.89	Item-144	0.88
Item-25	0.74	Item-65	0.79	Item-105	0.76	Item-145	0.83
Item-26	0.82	Item-66	0.8	Item-106	0.83	Item-146	0.85
Item-27	0.79	Item-67	0.86	Item-107	0.85	Item-147	0.87
Item-28	0.86	Item-68	0.78	Item-108	0.75	Item-148	0.9
Item-29	0.86	Item-69	0.75	Item-109	0.78	Item-149	0.85
Item-30	0.86	Item-70	0.88	Item-110	0.83	Item-150	0.87
Item-31	0.76	Item-71	0.75	Item-111	0.77	Item-151	0.88
Item-32	0.74	Item-72	0.88	Item-112	0.89	Item-152	0.82
Item-33	0.84	Item-73	0.75	Item-113	0.78	Item-153	0.84
Item-34	0.74	Item-74	0.85	Item-114	0.86	Item-154	0.78
Item-35	0.91	Item-75	0.81	Item-115	0.82	Item-155	0.77
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Item-36	0.86	Item-76	0.89	Item-116	0.76	Item-156	0.91
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Item-37	0.78	Item-77	0.81	Item-117	0.74	Item-157	0.77
Item-38	0.9	Item-78	0.82	Item-118	0.9	Item-158	0.85
Item-39	0.77	Item-79	0.83	Item-119	0.76	Item-159	0.76
Item-40	0.76	Item-80	0.86	Item-120	0.84		

After this the reliability and validity were found once again. For finding the reliability, test retest was done in the first sample. Table 2: Test-Retest and Inter Rater Reliability

Forms	Test-retest	Inter rater
Form-A	0.84	0.71
Form-B	0.69	0.76
Form-C	0.86	0.87
Form-D	0.72	0.83
Form-E	0.79	0.83
Form-F	0.85	0.8
Form-G	0.85	0.69

In the second sample parallel form method was adopted. In the third sample, split method was followed to find the reliability. The reliability of a test refers to stability of measurement over time. Reliability was measured with a reliability coefficient, which refers to a correlation between sets of scores from people who have been given the test on two occasions.

III. ASSESSMENT IN BRIEF

The updated assessment has been termed as Psycat Pro at the initial phase. Psychometric and cognitive ability tests are specifically designed to test and assess the human potentials, personality and characteristics. These tests are a standard and scientific method used to measure capabilities and behavioural style. Psychometric tests are designed to measure candidates' suitability for a role based on the required personality characteristics, aptitude and cognitive abilities. Psycat Pro is intended to compile and organize the profiles of candidates at the organizational level.

Patience plays an important role and contributes greatly in achievements. It is a key element of success at the workplace. Frequently, people need to face situations that require patience. They might need to work some extra hours due to an urgent need of some matters. Being patient means hearing, observing, taking advice from other people and seeking relationships that provide new means to make good decisions. Patience at industry or organization refers to the ability to work in a patient and an understanding manner among the people at work on a daily basis. It creates a better work environment because it prevents unnecessary arguments. It also builds trust by facilitating understanding and collaboration and it allows time for mistakes to be corrected or actions to be improved. Patience requires managing tough situations in a confident and an effective manner.

Emotion is a subjective state of mind. Emotions can be reactions to internal stimuli such as thoughts or memories or events that occur in our environment. Employees needs to feel satisfaction from their job as well as the environment between co-workers have to be characterized by team spirit. The result of these positive emotions is creativity, productivity, effectiveness and willingness to work. Emotions shape an individual's belief about the value of a job, a company, or a team. Emotions also affect behavior at work, Emotions are contagious and team members affect one another even after accounting for team performance.

Attitude refers to the feelings toward different aspects of life which determine people's reactions in different situations and formulates their perceptions. Positive work attitude is important because it fosters productive thinking and leads to productive working. When people have more positive work attitudes, they have the inclination to perform better leading to a higher company performance. In an organization, attitude refers to people's opinions, beliefs, and feelings about job satisfaction, job involvement and organizational commitment. People develop positive work attitudes as a result of their personality, fit with their environment, stress levels they experience, relationships they develop, perceived fairness of their pay, company policies and interpersonal treatment.

Social behavior is the activity of an individual which modifies or alters the act of another individual. Social behavior is stimulated by the society which again stimulates other members of the group or society. Social behavior gives organisms, in general, a better chance of survival, and an easier chance of promotions at work. At organization, work behaviour is the behaviour one uses in employment and is normally more formal than other types of human behaviour. This varies from profession to profession.

Planning and organizing helps to anticipate needs and problems and identifies the available choices. Being well-organized and developing effective plans also allows one to achieve important goals and objectives. It allows organizations to be proactive rather than reactive. It sets up a sense of direction. It increases operational efficiency. Planning at organization refers to making valuable planning ahead of action that helps one to be more efficient and productive. A primary function of strategic formal planning is providing direction to lower-level managers, allowing the development of tactical goals. Planning shows objectives for each organizational department and helps managers to prioritize activities depending on their relevance to the goal.

Obsession is an idea or thought that continually preoccupies or intrudes a person's mind. It's a good reflective index of someone's approach towards professional ethics, work passion, and goal oriented mindset. However, unattended and meaningless obsession may impede personal, professional and social life of an individual. In an organization, obsession can become a positive quality when it comes to capture the value. Obsession as a trait brings in discipline, disruptive thinking and has proved to be the key factor behind the success of many new age organizations. Only when this trait becomes extreme or maladaptive in an individual or a job role, then it can hamper personal and organizational growth.

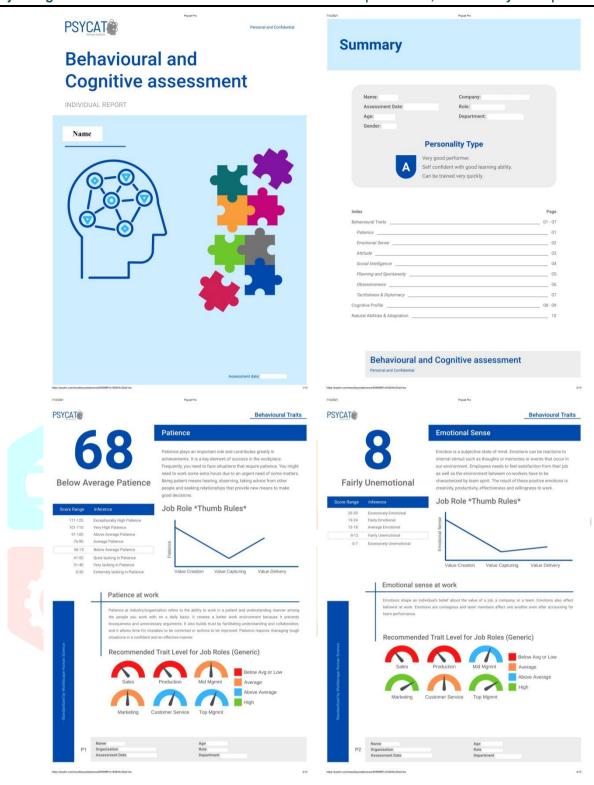
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Tactful and diplomatic skills support effective communication not only during a negotiation but also when an individual attempts to be assertive or persuasive. They, however, revolve around understanding the opinions, feelings, ideas, and beliefs of other people and showing sensitivity towards them. Tactful and diplomatic skills encompass a range of strengths and abilities that enable professionals to manage professional relationships. Tact is important when people have to deliver or provide critical feedback, whether in a personal or professional situation. Communicating tactfully and diplomatically strengthens one's reputation and builds credibility. It allows one to preserve existing relationships and build new ones.

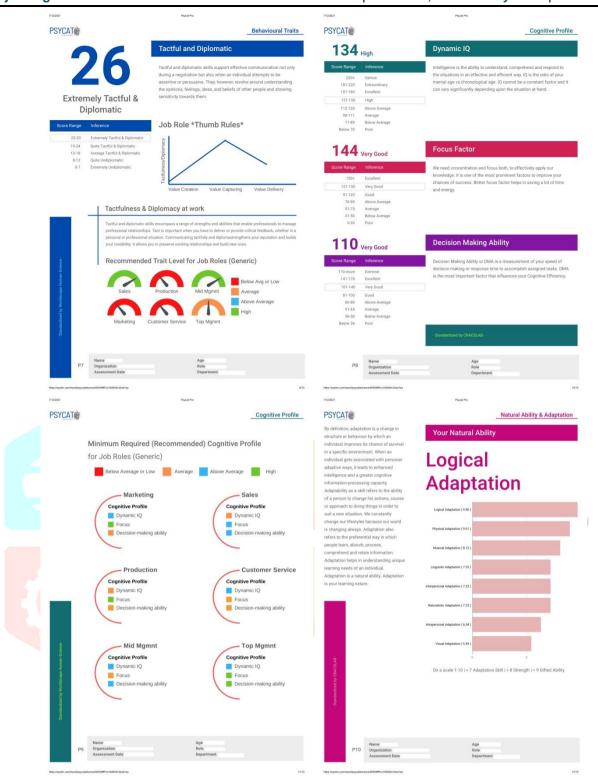
Intelligence is the ability to understand, comprehend and respond to the situations in an effective and efficient way. IQ is the ratio of mental age and the chronological age. IQ cannot be a constant factor and it can vary significantly depending upon the situation at hand. **Focus** is needed to apply knowledge effectively. It is one of the most prominent factors to improve chances of success. Better focus factor helps in saving a lot of time and energy. **Decision making ability** is a measurement of speed of decision making or response time to accomplish assigned tasks. It is the most important factor that influences cognitive efficiency.

Adaptation refers to a variation that can improve one's understanding, learning and fitness in a specific environment. Every individual has to adapt himself to the environment and situations around him so as to survive and facilitate his own development. It is the successful interaction of an individual with his environment. When an individual gets associated with personal-adaptive ways, it leads to enhanced intelligence and a greater cognitive information-processing capacity. Adaptation also refers to the preferential way in which people absorb process, comprehend and retain information. These adaptations can be measured on a scale of 1-10. Linguistic adaptation helps people to become good speakers and write well. Such people are good at storytelling and narration. They have an inclination towards creative writing. Logical adaptation helps people to solve puzzles and mysteries using deductive reasoning. Such people generally prefer to predict outcomes based on circumstances. Visual adaptation enables people with to think in pictures. They do well with art activities and puzzles. They prefer tasks like painting, map reading and map making. Musical adaptation makes people learn well through rhythm. They often enjoy musical activities. They generally like to write and recite poetry, perform dance routines to act out historical or literary events and create songs or raps about different concepts. Physical adaptation enables people to be involved in physical skills and are sometimes gifted athletes. They prefer dramatic re-enactments of historical or literary events. They prefer to use different body parts to measure objects and like to design & build architectural models. **Interpersonal** adaptation lets people to work well cooperatively and thrive on building friendships and relationships. They prefer working in small groups on a project. They are generally good mentors and like to conduct interviews. **Intrapersonal** adaptation equips people with high a high level of self-awareness and emotional intelligence. They generally like to keep a journal, write an autobiography and prefer to work independently. Naturalistic adaptation enables people to have an interest in earth sciences. They prefer to categorize species in the natural world and collect items from nature. They also show interest in cultivating plants and caring for stray animals.









IV. FINDINGS AND APPLICATION

Simplifying the processes, it is an online dashboard based assessment that contains most of the traits the organizations look for. It quantifies and infers the levels of patience, planning, emotional status, tactful behavior, attitude, social sense, attitude, obsessive behavior and intellectual levels of individuals. Besides, the important adaptations are scaled to ensure the right placement of the candidates. The findings of the assessment in question would help an organization to understand and organize profiles better.

V. CONCLUSION

Through a notifying concern, the study came out with significant results as the correlation coefficient was found to be significantly high witnessing the high reliability and validity of the test. Results indicated that PSYCAT PRO is reliable and valid tool in measuring psychometrics. A total of 650 interviews were completed. Overall subscales showed good internal consistency (0.74-0.91) and satisfactory test-retest as well as the inter rater reliability (0.69-0.89). The study aided in the development & standardization of a reliable and valid tool and therefore the objective of the research were achieved as a product intended to provide an insight into those scientific methodologies that can help to measure psychometrics, specifically the levels of patience, planning, emotional status, tactful behavior, attitude, social intelligence, attitude, obsessive behavior and intellectual levels of individuals. The new version of PSYCAT PRO is valid for a wide range of population, for professionals as well as

students above the age of 18 years. Advanced PSYCAT has thus emerged and confirmed to be a highly reliable and valid schedule as a psychometric and cognitive ability test & assessment.

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