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# An Exploration of Confirmatory Factor Analysis of Career Adaptability Skill among Technical and Vocational Education Students in Nigeria

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***Abstract:***
*This paper explored confirmatory factor analysis (CFA) of the measurement scales of vocational identity, career future concern, personal goal orientation, perceived social support, career self-efficacy, in relation to career adaptability skill among technical and vocational education (TVE) students in colleges of education in Nigeria. This enabled the researchers to understand how well the theoretical specifications of these key career-related factors match the reality of actual data of the study. The participants were 603 TVE students selected from six colleges of education in Nigeria. The selected students were from all the three levels of agricultural, business, and technical education programs of the colleges in the second semester of 2014/2015 academic session. A total of 353 were males representing 58.5%, and 250 were females. A set of structured self-reported questionnaire was used for data collection, and CFA aspect of structural equation modeling (SEM) was used for data analysis. Results indicated that the measurement model fits the data. For absolute fit, the relative chi-square (CMIN/DF) was 1.338, which is < 5.0, for incremental fit, IFI = 0.960, TLI = 0.959, and CFI = 0.960 which are > 0.90 needed to meet the requirement, for parsimony fit, CFI = 0.960 which is > 0.90, and RMSEA = 0.023 which is < 0.08 required. All the factor loadings were above .50, and all the values of AVE were > .50 showing strong convergent validity. The requirement for discriminant validity was met, and both construct and Cronbach alpha internal consistency reliabilities were > .70.Conclusion was drawn, and a suggestion for further studies covering polytechnics and university students in Nigeria was offered.*

***Keywords:*** *Career adaptability skill, Confirmatory factor analysis, Exploration, Nigeria, Students, Technical and vocational education.*

## 1. Introduction

The old traditional structures of work and the ways of doing them seem to be drastically giving way to new structures of work and ways of accomplishing them. It also seems a common experience today that, single or narrow career skill is no longer as marketable as it used to be in the 20th century labor market. These rapid changes are due to the continuous impact of new technologies on almost every occupational field, and have consequently continued to create new job opportunities with their inherent skill challenges (Sabatés, 2013; Stoltz, Wolff, Monroe, Farris, & Mazahreh, 2013). These persistent changes in work and work situations demand corresponding changes in career skills required of the workers to effectively perform in the new work situations. Therefore the existing adult workforce as well as the prospective ones, like the unemployed and students in tertiary education, need career adaptability skill to overcome these challenges.

### *1.1. Career Adaptability Skill*

Career adaptability skill enables existing workers to change jobs easily when necessary or cope with changes in the current career tasks, and also become more satisfied with their jobs (Eshelman, 2013; Gurvis & Calarco, 2004).Students also, as adolescents and prospective workers, need career adaptability skill for smooth transition from school to the labor market. Career adaptability skill is crucial to the career preparation and readiness of higher education students, especially, technical and vocational education (TVE) students, because, they are at the most difficult and sensitive stage of crystallizing their career choices which will enhance their transition process (Magruder, 2012; Eshelman, 2013; Creed, Macpherson, & Hood, 2011; Mansor & Rashid, 2013).

Career adaptability skill is a psychosocial construct that denotes an individual's resources for coping with current and anticipated development tasks, occupational transitions, and work trauma(Savickas, 1997; Tien, Wang, Chu, & Huang, 2012).From the perspectives of career construction theorists (Savickas, 2005), there are four Cs of career adaptability skill resources, which include concern, control, curiosity, and confidence. This theory suggests that adolescents should treat career choice decisions with concern for their future, a sense of control, an attitude of curiosity to explore self and environment, and confidence to design occupational futures with plans to make them real (Savickas, 2005; Savickas & Porfeli, 2011).These four Cs are important in actualizing career adaptability skill behaviors.

In recent times, the local and global labor markets' demand for career adaptability skill has been on the increase(UNESCO, 2012). This is because, most employers of labor nowadays are looking for employees with multiple skills who can solve multiple career tasks in their organizations (Jarvis, & Keeley, 2003; Carroll, 2008; Saari & Rashid, 2013; Barto, 2015).This demand for career adaptability skill seems to be more among the developing nations bedeviled with high rates of unemployment than the developed nations of the world where unemployment rates are relatively low. Despite the importance of career adaptability skill, literature has revealed that not much empirical investigations has been done on it among the TVE students in Nigeria (Ochedikwu, Ukuma, & Attah, 2013; Saba, Igwe, Mogaji, & Mustapha, 2013; Idris et al., 2012; Ohiwerei & Nwosu, 2013; Yusuff, & Soyemi, 2012).In the light of the above challenge, this study aims at exploring the confirmatory factor analysis (CFA) of the measurement theories of key career variables such as vocational identity, career future concern, personal goal orientation, perceived social support, career self-efficacy, in relation to the phenomenon, career adaptability skill among TVE students in colleges of education in Nigeria. This is with the purpose of building a realistic measurement model for career adaptability skill among TVE students in colleges of education in Nigeria.

*1.2. Vocational Identity*

One of the fundamental platforms by which adolescents are identified in the society is through their vocational identity. The formation of personal identity connects the adolescents to the career environment of the society where there will be interactions between them and environment. This makes vocational identity very important in adolescent stage of life. The three domains in the process of forming personal identity includes occupational domain, the ideological domain, and the sexual domain (Macovei, 2009). Macovei further stressed that occupational (vocational) identity is the most difficult to acquire by the adolescents, because of the pressure involved in the process of discovering it. Some processes of self-exploration and exploration of environment characterize the crystallization of vocational identity. The processes enables the individuals to become more aware of their personal interests, skills, competences, and values, as well as preferences for some types of activities, jobs, interactions, and working environments (Macovei, 2009).

Vocational identity is conceptualized by Super (1957) as a set of vocational behaviors expected at a particular stage of an individual's career development. However, Holland, Gottfredson, and Baker (1990), Holland, and Holland (1997), and Holland, Johnston, and Asama (1993), defined vocational identity as the possession of a clear and stable picture of one's goals, interests, and talents. Having a clear picture of one's goals, interests and talents can aid the development of a sound career adaptability skill behavior. This is because career adaptability skill may be developed from an existing talents of an individual with defined personal career identity and goals.

Vocational identity derived status groups can be viewed from four dimensions, and these includes achievement, foreclosure, moratorium, and diffusion (Marcia, 1980; Hirschi, 2012). These four identity statutes were developed by Marcia (1980) from Erikson's theory of ego development. Achievement status of vocational identity connotes a stage where an individual has successfully resolved identity crisis and is now committed to his chosen career goals; depicting high commitment and high exploration. Foreclosure status refers to premature identification with a role model without prior exploration, and crisis, therefore leading to high commitment, low exploration. Vocational identity moratorium status refers to an active on-going process of exploration and crisis, and an un-readiness or unwillingness to commit to a certain identity, depicting high exploration, but low commitment. Identity diffusion status of vocational identity means a lack of engagement in identity formation process leading to low exploration and low commitment.

*1.3. Career Future Concern*

Another career development task confronting TVE students in higher education is the issue of career future concerns with regards to career adaptability skill. Career concerns may have to do with individual's feeling condition of uneasiness, uncertainty, and apprehension of burdens related to future occupational life. Savickas, Passen, and Jarjouara (1988) , and Cairo, Kritis, and Myers (1996) described career concerns as concerns about an individual's future career that depict worry or regret about recent task failure, anxiety about a present task, excitement or stress of planning for a future task. Career future concerns refers to apprehension about managing what an individual rates as being personally important or essential to his or her career development (Code, & Bernes, 2006) The stress associated with managing career-related tasks is considered as career concerns (Yousefi, Abedi, Baghban, Eatemadi, & Abedi, 2013). Students have to adjust to the structured educational experience, monitor, resolve issues regarding their career direction, and manage educational and life demands as they grow as young adults (Creed, Fallon, & Hood, 2009). In addition, the students have to manage these career-related tasks in the context of family, peer, and educational institution expectations.

Career future concerns has four dimensions by which it can be measured and these include self-capacity, negative career outlook, career awareness, and issues associated with work-life balance (Westbrook, Sanford, O'Neal, Horne, Fleenor, & Garren, 1985; Rottinghaus et al., 2011a). Career future concerns, which can be liken to the expression of worry or fear for the unknown career future may have some predictive power of career adaptability skill among TVE students.

*1.4. Personal Goal Orientation*

Goal setting usually motivates people to perform certain tasks towards achievement. Bandura (1986) opined that, most human behaviors were goal-directed, and that actions were performed to achieve positive outcomes or to avoid negative ones. The way people experience, act, and interpret or deliver in achievement situations usually hinges on the type of goal orientation set at the beginning of the task(Elliot, & Harackiewicz, 1996).Personal goal orientation may be described as individual's disposition towards pursuing or performing a set task in achievement circumstances. Bandura (1986), and Latham (2000) identified variables of personal goal orientation to include learning goal orientation, performance-prove goal orientation, and performance avoid goal orientation. Research, for example, have shown that persons with high-learning goal orientation, seek to master new skills, complete difficult tasks, and succeed in overcoming obstacles (Meece, Anderman, & Anderman, 2006; Garcia, Restubog, Toledano, Tolentino, & Rafferty, 2011). Students with high learning goal orientation may also be positively high in career adaptability skill, because their characteristics of seeking to master new skills, completing tasks, and overcoming obstacles are in tandem with career adaptability skill.

*1.5. Perceived Social Support*

Career adaptability skill formation may be strengthened with positive perceived social support from the environment. Social support is viewed as an important factor in the process of career development (Cohen, & Matthews, 1987). This social environmental variable, (perceived social support) is among the social cognitive career theory (SCCT) constructs which supports the development process of career adaptability skill among adolescents. The SCCT emphasizes the importance of understanding perceived social support aspect of the environment (Lent, Brown, & Hackett, 2002). Perceived social support is essential to young people especially at the stage of making crucial decisions in life such as their career future.

Perceived social support can be described as a kind of personal perception or feeling that one is being cared for by other persons. Perceived social support is usually defined by the characteristics of social environment, social networks, and the benefits they provide (Cohen & Matthews, 1987).Conceptually, Cobb (1976) referred to perceived social support as the individual belief that one is cared for and loved, esteemed and valued, and a feeling of belonging to a network of communication and mutual obligations. Perceived social support is the potential of the network to provide help in situations when needed (Yousefi et al., 2013).Among higher education students, perceived social support sources mainly include family, friends, educational institution, and significant others (Weisenberg & Aghakhani, 2007). Kracke (2002) identified social support as the potential resource available to individual for gathering career specific information and advice. The function of perceived social support to students is to facilitate their transitions from school to work life (Murphy, Blustein, Bohlig, & Platt, 2010).It suggests that perceived social support may contribute to the development process of career adaptability skill among young adults like TVE students in colleges of education in Nigeria.

*1.6. Career Self-Efficacy*

The propositions of self-efficacy theory of career development by Bandura (1977) were first applied by Hackett, and Betz (1981) in a study of career development of women. The authors found that self-efficacy beliefs of people influenced their career decisions, achievements, and coping or adjustment behaviors. Their results confirmed Bandura's social cognitive theory which proposes that individuals' beliefs and confidence in their ability to perform a given tasks and behaviors successfully (self-efficacy expectations) influence their choices, performance and persistence in these tasks and behaviors(Bandura, 1986). Bandura further stressed that, while low self-efficacy expectations would lead to avoidance behavior, high self-efficacy expectations would encourage approach behavior towards specific tasks performance or behaviors. The concept of self-efficacy expectations simply means that people can be better rated or predicted by their beliefs about their capabilities than by their actual capabilities. This makes self-efficacy to be one of the most theoretically, heuristically, and practically useful concepts ever developed in the field of psychology (Bandura, 1986).

Self-Efficacy belief is developed and increasingly expressed via four major processes and sources of information. These sources include a) past performance accomplishments and successful mastery experience, b) vicarious learning experiences through observing the performance of role models and modelling them, c) verbal persuasion, such as social influences in response to one's abilities and encouragements from others, and d) emotional arousal, such as anxiety and other negative psychological states (Bandura, 1982).These processes or sources of self-efficacy are important to the understanding of career adaptability skill among TVE students in colleges of education because of their characteristics of helping an individual to adjust and respond to career development situations.

This study aims at exploring the confirmatory factor analysis (CFA) of vocational identity, career future concern, personal goal orientation, perceived social support, career self-efficacy, in relation to career adaptability skill among TVE students in colleges of education in Nigeria. This is to enable the researchers understand how well the theoretical specifications of factors match the reality of actual data of the study. The question therefore is, how well does the theoretical specifications of these key career-related variables match the actual data of the study?

**2. Methods**

*2.1. Design*

This study used confirmatory factor analysis (CFA) technique to examine the measurement theories of the variables of the study.CFA helps to confirm or reject preconceived theories and their specific hypotheses (Hair, Black, Babin, Anderson, 2010).A cross-sectional method of data collection was used with a self-reported questionnaire directly administered on the TVE students in colleges of education during lecture periods in their lecture halls. Prior this time, permission was granted by the management of the colleges for

the conduct of this test. Participants were adequately briefed on how to respond to the research instrument, and their participation was purely made voluntary in line with ethical issues as demanded in research studies (Huck, 2008; Fink, 2009; Fraenkel, Wallen, & Hyun, 2012).

*2.2. Participants*

Participants were 603 TVE students in all levels of Agricultural, Business, and Technical Education programs selected from six colleges of education in Nigeria. Male participants were 353, representing 58.5%, and female were 250, representing 41.5%, with an average age of 22years. Agricultural education major represented 34.8%, business education major represented 36.0%, and technical education represented 29.2%.Participants from 100 level represented 33.3%, 200 level 34.2%, and 300 level represented 32.5%.

**3. Instrument**

The measurement scale used for each construct of this study is individually presented below.

*3.1. Career Adaptability Skill*

Career adaptability skill was measured by the use of Career Adapt-Abilities Scale (CAAS) South African Form designed by Maree (2012) from International Form 2.0 (Savickas & Profeli, 2012, this issue). The form is similar to Taiwan's form designed by Tien, Wang, Chu, and Huang (2012). The adopted South African Form consists of 24 items which are divided into four subscales to measure adaptability resources of concern, control, curiosity, and confidence. Participants responded on a 5 point Likert type scale format from *1 (not strong) to 5 (strongest).* The reliability coefficient of CAAS- International Form 2.0 reported by Savickas, and Porfeli (2012) was .92, while the subscales had .83 for concern, .74 for control, .79 for curiosity, and .85 for confidence. For South African Form, Maree (2012) reported reliability coefficients were a little lower, the total score was .91 while the subscales were .77 for concern, .71 for control, .78 for curiosity, and .80 for confidence respectively. However, in this study, the composite reliability of the instrument was α = .95, while the subscales were α = .92 for concern, α = .91 for control, α = .89 for curiosity, and α = .90 for confidence.

*3.2. Vocational Identity*

Vocational identity was measured by the use Occupational Identity Scale (OIS) first published by Melgosa (1987) and complemented by Veiga and Moura (1999, 2005). The adapted instrument has 28 items sorted into four statutes of vocational identity, achievement, moratorium, foreclosure, and diffusion. Sample items include "After many doubts and considerations, I have it clearly in my mind what my occupation will be" and "It is too early for me to be concerned about my professional future" Participants responded on a 5 point Likert type scale format from *strongly disagree (1) to strongly agree (5).* The initial Cronbach Alpha reliability coefficients for internal consistency of the four statutes (dimensions) of the instrument achieved were; α = .81 for achievement, α = .82 for moratorium, α = .76 for foreclosure, and α = .83 for diffusion (Veiga & Moura, 2005). For the current study, α = .93 for achievement, α = .94 for moratorium, α = .93 for foreclosure, and α = .92 for diffusion. The composite reliability of the instrument for this study was .90.

*3.3. Career Future Concern*

Career future concern was measured by the use of Career Future Inventory-Revised Scale (CFI-RS) published by Rottinghaus et al (2011a). The adapted instrument has 28 items designed to assess the perceived future career concerns. However, items 21-24 were deleted before it was used because the items were already being measured by another instrument in the study. The subscales include career agency (self-capacity), negative career outlook, occupational awareness (career awareness), support, and work-life balance. Sample items include "I doubt my career will turn out well in the future", and "I lack the energy to pursue my career goals". The participants responded on a 5-point Likert type scale of *strongly disagree to strongly agree*. Cronbach's alpha internal consistency and reliability coefficient of .88, .77, .80, .77, and .75 were initially achieved for the subscales respectively from the validation sample of the instrument (Rottinghaus et al., 2011).In this study, the values achieved for the subscales include; α = 93 (self-capacity), α = .84 (negative career outlook), α = .85 (career awareness), and α = .89 (work-life balance). The composite reliability of the instrument was α = .90.

*3.4. Personal Goal Orientation*

Personal goal orientation was measured by an adapted Person variables of Goal- orientation Scale (VandeWalle, 1997) which was used by Creed, Fallon, and Hood (2009). It is a 13-item scale that measures three types of goal orientation; learning, performance-prove, and performance-avoid. Learning is measured by 5 items, performance-prove by 4 items, and performance avoid by 4 items. Sample item for learning orientation is "For me, development of my skills is import enough to take risks". Sample for performance-prove include "I enjoy it when others are aware of how well I am doing". Then, sample for performance-avoid include "I prefer to avoid situations where I might perform poorly". The participants responded on a 5-point Likert type scale of *strongly disagree* to *strongly agree.* The original sample reported internal reliability coefficients of .89 for learning, .85 for performance-prove, and .88 for performance-avoid respectively. The internal reliability coefficients of the subscales for this current study are; α = .93 for learning goal, α = .92 for performance prove, and α = .90 for performance avoid. The composite reliability for the instrument was α = .89.

*3.5. Perceived Social Support*

Perceived Social Support was measured by the use of Multidimensional Scale of Perceived Social Support which consists of a 12-item scale (Zimet, Dahlem, Zimet, & Farley, 1988; Yousefi et al., 2011). The instrument was adopted to measure perceived social supports from family, friends, and significant others. It is divided into three subscales (4 items per subscale) which each of them measures one variable. Sample items include "My family really tries to help me" (family), "I can talk about my problems with my friends" (friends), and "There is a special person who is around when I am in need" (significant others). Participants responded on a 5-point Likert type scale format of *strongly disagree (1)* to *strongly agree (5)*. The previous internal reliability coefficients of .75 for family, .79 for friends, and .73 for significant others were reported by Yousefi et al (2011). The current study achieved internal reliability coefficients of α =.91 for family, α =.91 for friends, and α =.93 for significant others respectively. The composite reliability of the instrument was α =.91.

*3.6. Career Self-efficacy*

Career self-efficacy was measured by the use of Career Self-Efficacy Sources Scale (CSESS) as published by Betz, Klein, and Taylor (1996). The adopted instrument consists of 20 items based on Bandura's (1977) four sources of self-efficacy belief.The scale has five subscales which are 1) Vicarious learning 2) Verbal persuasion 3) Emotional arousal positive 4) Emotional arousal negative, and 5) Performance accomplishment. Samples include "I see other students like me get good jobs after college" (vicarious learning), "people tell me that I should find a job easily" (verbal persuasion), "I feel really great when I am doing things to find a career" (positive emotional arousal), "I get sinking feeling when I think of working on my job search" (negative emotional arousal), and "I have done well in the past in finding jobs" (performance accomplishment). The participants responded on a 5 point Likert type scale of *never* to *very often*. Past studies have indicated acceptable levels of reliability and construct validity. In this current study, the internal consistency coefficients of the subscales were achieved as follow: α =.86 for vicarious learning, α =.86 for verbal persuasion, α =.86 for emotional arousal positive, α =.87 for emotional arousal negative, and α =.86 for performance accomplishment. The composite reliability after reversing negatively worded items was α =.90.

**4. Results**

It is important at this point to briefly state the rule of thumb for conducting CFA before the presentation of results.CFA is used purposely to perform three major analyses for individual construct, and these include test for model fit, convergent validity, and construct reliability (Awang, 2012; Samah, 2014). The model fit indices, according to Hair et al (1995) and Holmes-Smith (2006), as reported in (Awang, 2012), must satisfy at least, three requirements, which must include one from each category of model fit index.The index categories include absolute fit (Chisq, RMSEA, GFI), incremental fit (AGFI, CFI, TLI, NFI), and parsimonious fit (Chisq/df). These authors further recommended that fit indices should always include relative chi-square (chisq/df), root means square error of approximation (RMSEA), and any other.

Convergent validity refers to the internal consistency presumed of a set of indicators or items in a construct (Kline, 2005; Brown, 2006).It is the group of items that presume to measure a certain construct, and these items tend to represent the collective strength of associations or relationships between the indicators predicted by the researcher to represent a single construct (Hair, Black, Babin, & Anderson, 2013).The characteristics of the indicators include strong relationship between them, and clear representation of one factor only, average variance extracted (AVE) for each latent construct should not be less than 0.50, and factor loading not less than 0.50 (Hair, Black, Babin, & Anderson, 2010; Byrne, 2010).A high value of AVE (AVE > .50) shows a high or strong convergent validity.

After the convergent validity is tested, construct reliability (CR) is the next to be tested, which is comparable to Cronbach Alpha.A construct reliability of ≥ .70 is mostly considered reliable among researchers (Hair et al, 2010; Gravetter, & wallnau, 2014).Then, Kline (2011) outlined that Cronbach Alpha of ≥ .90 is excellent, ≥ .80 is very good, ≥ .7 is adequate, and < .5 is not reliable. Therefore, for any instrument to be considered reliable, the Cronbach Alpha must be ≥ .70.Lastly, there are two methods for conducting CFA (Awang, 2012), and these include separate running of CFA for each latent construct, and simultaneous running of CFA for all latent constructs.

*4.1. Test Results for Measurement Model Fit*

In this study, simultaneous running of CFA was adopted save space and time.The initial measurement model from the CFA consisted of the six latent constructs, which include vocational identity, career future concern, personal goal orientation, perceived social support, career self-efficacy, and career adaptability skill.These constructs were assessed for model fitness across the recommended category of fitness indexes which include absolute fit, incremental or baseline comparison fit, and parsimony or adjusted measure fit (Awang, 2012).Model fitness test is important because it helps to reveal whether the available data fits the proposed model or not.Results from the model fitness tests revealed that the model fit the study data.The results indicated that, for absolute fit, the relative chi-square (CMIN/DF) was 1.338, which is < 5.0. Then, for incremental fit, IFI = 0.960, TLI = 0.959, and CFI = 0.960 which are > 0.90 needed to meet the requirement.The parsimony fit, indicated CFI = 0.960 which is > 0.90, and RMSEA = 0.023 which is < 0.08 required to be accepted (Awang, 2012; Hair, Black, Babin, & Anderson, 2013).This initial model met the measurement model fitness requirement as presented in Table 1

| Name of Category | Name of Index | Index Value | Comment |
|---|---|---|---|
| 1. Absolute Fit | RMSEA | 0.023 | Required level is achieved |
| 2. Incremental Fit | CFI | 0.960 | Required level is achieved |
| | TLI | 0.959 | Required level is achieved |
| 3. Parsimonious Fit | Chisq/df | 1.338 | Required level is achieved |

*Table 1: Assessment Results of Fitness for the Initial Measurement Model*

*4.2. Test Results for Discriminant Validity*

Discriminant validity is meant to reveal the extent that one construct is actually distinct from another construct in a particular study. It involves relationship or association between one latent construct and others of similar nature (Brown, 2006; Hair et al., 2010).Three methods are available for testing discriminant validity, they include, the use of correlation coefficient, r > 0.85 shows a violation of discriminant validity (Fornell & Larcker, 1981; Awang, 2012), the use of AVE with $r^2$, that is, if the square root of each AVE is greater than correlation value between a pair of constructs. In other words, AVE for two constructs must be greater than their $r^2$(Byrne, 2010).

The discriminant validity for this study was conducted using AVE values and $r^2$, and the results from the initial measurement model indicated that two pairs of constructs, (career future concern & vocational identity), and (career future concern & personal goal orientation) were too highly correlated with correlation coefficient (r) values of 0.851, and 0.894 respectively. The results are as presented in Table 2.These values violated discriminant validity assumptions according to Awang (2012).Career future concern was therefore deleted from the measurement model, and a re-run was made. The new results indicated improved correlation coefficients, and the discriminant validity for the model was achieved. The summary of the results for the new model fit, and discriminant validity tests based on the modified measurement model are as presented in Tables 3 and 4, respectively.

| | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| 1. Career Adaptability Skill | **0.797** | | | | | |
| 2. Vocational Identity | 0.476 | **0.820** | | | | |
| 3. Career Future Concern | 0.599 | 0.851 | **0.768** | | | |
| 4. Personal Goal Orientation | 0.625 | 0.598 | 0.894 | **0.842** | | |
| 5. Perceived Social Support | 0.490 | 0.572 | 0.773 | 0.727 | **0.853** | |
| 6. Career Self-Efficacy | 0.656 | 0.402 | 0.554 | 0.477 | 0.404 | **0.781** |

*Table 2: Initial Measurement Model Test Results for Discriminant Validity*

| Name of Category | Name of Index | Index Value | Comment |
|---|---|---|---|
| 1. Absolute Fit | RMSEA | 0.023 | Required level is achieved |
| 2. Incremental Fit | CFI | 0.971 | Required level is achieved |
| | TLI | 0.970 | Required level is achieved |
| 3. Parsimonious Fit | Chisq/df | 1.306 | Required level is achieved |

*Table 3: Assessment Results of Fitness for the Modified Measurement Model*

| | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| 1. Career Adaptability Skill | **0.796** | | | | |
| 2. Vocational Identity | 0.467 | **0.820** | | | |
| 3. Personal Goal Orientation | 0.627 | 0.590 | **0.849** | | |
| 4. Perceived Social Support | 0.491 | 0.542 | 0.733 | **0.853** | |
| 5. Career Self-Efficacy | 0.644 | 0.383 | 0.466 | 0.395 | **0.779** |

*Table 4: Modified Model Test Results for Discriminant Validity*

Finally, the discriminant validity of the modified measurement model was achieved, since the diagonal values in bold print (root of AVE) in Table 4 are greater than the values in their respective rows and columns (Hair et al., 2010).After the redundant construct (career future concern) was deleted, all the correlations between each pair of the exogenous latent constructs met the requirement of r < 0.85 level of acceptance.

*4.3. Summary of CFA*

In summary, the confirmatory factor analysis (CFA) of career adaptability skill among technical and vocational education (TVE) students in colleges of education in Nigeria was conducted on six latent constructs. These constructs were measured through their observed variables or items. A total number of 121 items from six different instruments were used to measure the six constructs respectively. The results of the CFA indicated that all the six instruments are reliable, however one construct (career future concern) was eventually deleted for violating assumption of discriminant validity. The model fits the data as presented in Table 4.The factor loadings satisfied the recommended value of not < 0.50, and for the convergence validity, the values of average variance extracted

(AVE) met the acceptable level of not < 0.50.One construct was however deleted later to meet the assumption for discriminant validity.The values of construct reliability (CR) also fulfilled the set requirement of not < 0.70, which is comparable to Cronbach Alpha reliability (Hair, et al, 2010; Byrne, 2010).Tables 5 and 6 present the summary of the CFA results and the Cronbach Alpha reliabilities for constructs and their dimensions respectively. In conclusion, the CFA for this study satisfied the requirements for further analysis, and the standardized measurement model for the study is as presented in Figures 1.

| **Construct** | **No of Items** | **AVE** | **Cronbach Alpha** | **C R** |
|---|---|---|---|---|
| Vocational Identity (VID) | 28 | 0.593 | 0.896 | 0.971 |
| Career Future Concern (CFC) | 24 | 0.536 | 0.896 | 0.958 |
| Personal Goal Orientation (PGO) | 13 | 0.650 | 0.888 | 0.967 |
| Perceived Social Support (PSS) | 12 | 0.677 | 0.908 | 0.969 |
| Career Self-Efficacy (CSE) | 20 | 0.586 | 0.902 | 0.972 |
| Career Adaptability Skill (CAS) | 24 | 0.627 | 0.947 | 0.974 |
| **Total** | **121** | - | - | - |

*Table 5: Summary of CFA Results for individual Construct*

| **Construct** | **Dimension** | **Dimension Reliability** | **Construct Reliability** |
|---|---|---|---|
| Vocational Identity (VID) | - | - | .896 |
| | achievement | .932 | |
| | moratorium | .940 | |
| | foreclosure | .932 | |
| | diffusion | .916 | |
| Career Future Concern (CFC) | - | - | .896 |
| | self-capacity | .927 | |
| | negative career outlook | .839 | |
| | career awareness | .850 | |
| | work-life balance | .892 | |
| Personal Goal Orientation (PGO) | - | - | .888 |
| | learning goal | .928 | |
| | performance prove | .895 | |
| | performance avoid | .916 | |
| Perceived Social Support (PSS) | - | - | .908 |
| | family | .911 | |
| | friends | .909 | |
| | significant others | .926 | |
| Career Self-Efficacy (CSE) | - | - | .902 |
| | vicarious learning | .862 | |
| | verbal persuasion | .861 | |
| | emotional arousal positive | .856 | |
| | emotional arousal negative | .872 | |
| | performance accomplishment | .863 | |
| Career Adaptability Skill (CAS) | - | - | .947 |
| | concern | .918 | |
| | control | .905 | |
| | curiosity | .887 | |
| | confidence | .902 | |
| | | | |

*Table 6: Cronbach Alpha Reliabilities of Constructs and Dimensions*

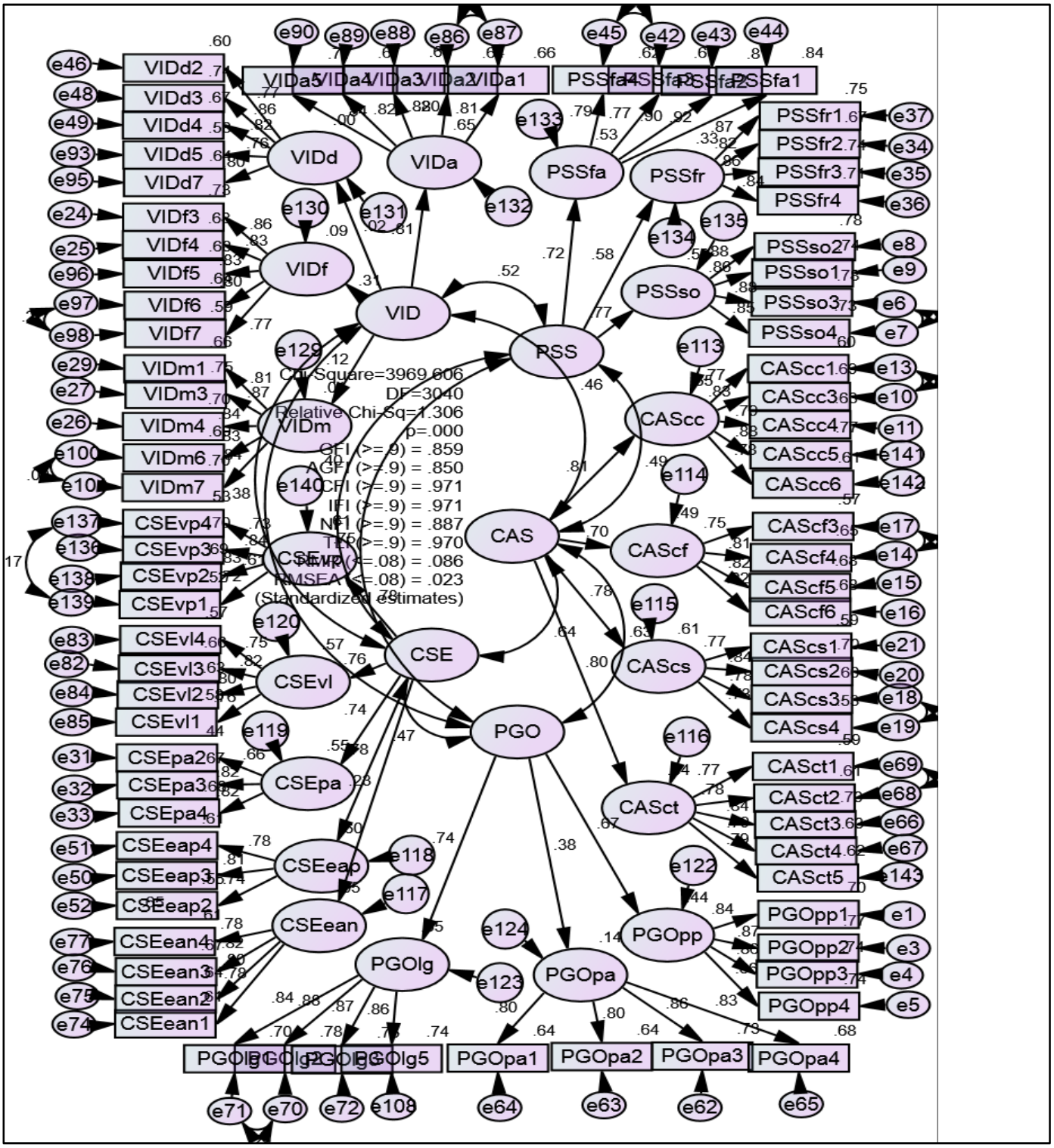


*Figure 1: Modified Standardized Measurement Model of Career Adaptability Skill among TVE Students in Colleges of Education in Nigeria*

**5. Discussion**

This study explored confirmatory factor analysis (CFA) of vocational identity, career future concern, personal goal orientation, perceived social support, career self-efficacy, in relation to career adaptability skill among TVE students in colleges of education in Nigeria. This was done to enable the researchers understand how well the theoretical specifications of factors match the reality of actual data of the study. The CFA was initially conducted on six latent constructs simultaneously in order to save space and time. The initial measurement model from the CFA with six latent constructs, which include vocational identity, career future concern, personal goal orientation, perceived social support, career self-efficacy, and career adaptability skill fits the data. However, the model was modified because the assumption of discriminant validity was violated. The modified measurement model had five latent constructs

which include vocational identity, personal goal orientation, perceived social support, career self-efficacy, and career adaptability skill.

The CFA results for vocational identity (VID) as indicated on the modified measurement model in Figure 1 revealed that the number of its items was modified from 28 to 20 to enable the model fit the data of the study. For personal goal orientation (PGO), the number of itemswas modified from 13 to 12, while for perceived social support (PSS), the 12 items were retained in the analysis. The results also indicated that, for career self-efficacy (CSE), the number of items was modified from 20 to 18, whereas, for career adaptability skill (CAS), the number of items was modified from 24 to 18 in order for the model to fit data. The modification also merged some items within the same construct to strengthen their contribution to their parent constructs by covariate technique. However, the number of dimensions of each construct was retained eventually. Finally, the CFA produced a measurement model for career adaptability skill among TVE students in colleges of education in Nigeria with 80 items from the initial 121 items as earlier presented in Table 5 of the study having satisfied all the requirements. The results of this study has supported the existing theories proving the utilities of these measurement scales among students or adolescents in Nigeria settings.

**6. Conclusion**

The desire to understand how well the theoretical specifications of vocational identity, career future concern, personal goal orientation, perceived social support, career self-efficacy, in relation to career adaptability skill among TVE students in colleges of education in Nigeria fit the data collected for this study has been satisfied by the results of the CFA. The researchers have confirmed the utility of the measurement scales adopted in this study from the fitness of the modified measurement model to the data. Therefore, a realistic measurement model for career adaptability skill among TVE students in colleges of education in Nigeria has been developed which may be of benefit to all the stakeholders in TVE in Nigeria. However, caution must be exercised not to generalize the outcome of this study beyond the population from which sample was taken. Therefore, there searchers suggest that, further similar studies be conducted among polytechnics and university students in other disciplines in Nigeria.

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