Personnel selection test design based on classical test theory, the case of car salespeople

Diseño de tests de selección de personal a partir de la teoría clásica de los tests, el caso de vendedores de vehículos

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Abstract

The aim is to design a valid and reliable test for the selection of motor vehicle salespeople working at a national distributor car and vehicle dealer and to share the validation process proposed by the classic test theory. In the first phase, a qualitative, exploratory and inductive phenomenological study was carried out, through interviews, focus groups and job application analysis, in order to identify the characteristics of successful salespeople. In a second phase, a quantitative test was designed to measure these characteristics. identified in the first phase. Eleven traits were identified in the first phase, none related to sales commissions, but an exploratory factor analysis identified a fifteen-item construct, with a reliability of .94, which correlates significantly and negatively (-.41**) with sales commissions, and which selects salespeople who earn more than double in sales commissions. A LISREL confirmatory factor analysis confirms the findings of the exploratory analysis. As this is a first study, it is necessary to replicate it with other samples to confirm validity. No published sales tests were found in the international and Latin American literature that provide evidence of construct and criterion validity; tests can contribute to optimizing talent management. The main finding is the identification of a construct that predicts sales success.

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Peer Review under the responsibility of Universidad Nacional Autónoma de México.

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Resumen

El objetivo es diseñar un test válido y confiable para la selección de vendedores de vehículos automotores que laboran en una distribuidora nacional y compartir el proceso en la elección y/o diseño de tests de acuerdo a la teoría clásica de los tests. En una primera fase se realizó un estudio cualitativo de tipo fenomenológico exploratorio e inductivo, mediante entrevistas, grupos focales y análisis de solicitudes para identificar las características de vendedores exitosos y en una segunda fase se diseñó e investigó un test de tipo cuantitativo para medir las características identificadas en la primer fase. Se identificaron once rasgos de en la primera fase, ninguno se relacionó con comisiones por ventas, pero un análisis factorial exploratorio y otro confirmatorio, identificó un constructo de 15 ítems, con una confiabilidad de .94, que correlaciona significativa y negativamente (-.41**) con comisiones por ventas; los vendedores con bajos puntajes en el test ganan más del doble en comisiones de ventas. Debido a que se trata de un primer estudio, requiere replicarse con otras muestras a fin de confirmar su validez. Cabe mencionar que en la literatura internacional y latinoamericana no se encontraron tests publicados de ventas que aporten evidencia de validez de constructo y de criterio, los tests deben contribuir a la optimización de la administración del talento. El principal hallazgo es la identificación de un constructo que predice el éxito en ventas.

Código JEL: C53, J00, M12
Palabras clave: teoría clásica de los tests; validez; confiabilidad; vendedores

Introduction

The article describes the process of constructing valid tests for personnel selection. In the case of this research, the process is exemplified in the case of a test designed for the selection of vehicle salespeople employed at a national distributor operating in Mexico. The test took two years to design, involving individual interviews and focus groups with executives, managers, and successful salespeople; analysis of saleséople's files and applications to identify characteristics linked to sales success; writing Likert-type items; and comparing the test results with salespeople's performance measurements in terms of sales commissions earned.

Eleven personality constructs associated with sales success were identified and 63 items related to these constructs were written (2016); the online test was administered to candidates for the position of salesperson (2016) and two years later (2018) the performance of the salespeople was measured in terms of average daily commission received per sale.

The results of the initial analyses were disappointing, as none of the eleven constructs were associated with the variable "commission." However, an exploratory factor analysis identified a reliable 15-item test (Cronbach's alpha of .94) and a significant correlation of -.41** with the variable commission. A bimodal distribution was found distinguishing high-scoring salespeople from low-scoring salespeople and a cutoff score separating the two groups. Consequently, the test identifies salespeople with low test scores who sell 2.5 times more, in monetary terms (commissions), than salespeople who

score high on the test. It is worth mentioning that an unexpected personality construct, called optimism, was discovered. Another finding is the reduction in voluntary turnover of sales staff from 8.1 attritions per annual hire (2014) to a ratio of 0.4 attritions per annual hire (2018).

Note: The distributor has authorized publishing the research and the use of the 15-item test in exchange for citation of the authors of this article.

Background

In 2016, a car and truck dealership with branches in several states of the country requested the design of a test for the selection of salespeople due to an unsatisfactory staff turnover situation and because they wanted a better option than the tests that AMEDIRH (2021, Spanish: Asociación Mexicana de directores de Recursos Humanos) offers to its clients, the Terman (Society of Applied Psychology, 2000), the Cleaver (Society of Applied Psychology, 2000) and the PIPG (Gordon, 1994). Therefore, the objectives of the research are to identify the characteristics of successful salespeople and to design a valid and reliable test for their selection.

Tests to predict sales success include the inventory and profile of the seller or IPV(Manual Moderno, 2016) and the 16 Personality Traits Test or 16 PF (Catell & Mead, 2008). The SPI manual claims that the test has defined 10 salesperson personality traits and, through extensive studies, is valid and reliable. However, it does not offer evidence of its predictive validity. Similarly, the 16 PF does not provide evidence of predictive validity, but it does identify two traits associated with sales: the O- (serene adaptation) and the M- (objectivity).

Arias (2018) paints a "bleak" picture of the use made of tests in Mexico and probably in other countries of the continent. It is common for those responsible for personnel selection to use tests without checking whether they are reliable, valid, and appropriate for the particular positions that require the right personnel. Arias comments that it is common to use tests designed in other regions, at different times, and in another language, and that those responsible for recruitment and selection blindly trust in their predictive power. Consequently, this author recommends previous validity, reliability, and standardization studies and considers other techniques, such as interviews and work samples. Thus, the objectives that users and designers of new tests are expected to achieve are to master contemporary theoretical principles and psychometric concepts, to recognize common misconceptions that lead to misuse of tests and misinterpretation of test results, and to illustrate how seemingly complex and sophisticated concepts and methodologies can be understood and in easily understandable terms. Statistical topics, ranging from standard deviation to factor analysis, are illustrated in the article.

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The test user can only adequately evaluate a test if he or she is familiar with the main steps of test construction and is aware of the main psychometric characteristics of tests, especially as they relate to norms, reliability and validity. By test user, in contrast to test constructor, the authors mean essentially anyone who has the responsibility of choosing tests or interpreting scores and using them as a source of information for making practical personnel selection decisions. Test users (test applicators) include teachers, students, human resource managers or human capital managers in the private or government sectors, consultants and researchers.

Many current criticisms of testing are directed at the tests and the misuse of tests by unqualified users. Management professors, human resources, psychometrics, and organizational psychology professors can play a dual role in helping to disseminate accurate information about tests and thus combat misuse and misinterpretation. First, they can contribute through the knowledge they pass on to their students in their classes; second, they can serve as specialists in answering special questions that are sure to be asked of them by organizations, users, colleagues, and their students. Therefore, teachers, consultants, and human resources or human capital managers, whatever their fields of expertise, need to master knowledge about the technical properties of tests, in particular about:

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resources or human capital managers, whatever their fields of expertise, need to master knowledge about the technical properties of tests, in particular about:

* * Norms and interpretation of test scores (Anastasi, 1997; Herrera & León, 2022)
* * Reliability and measurement error (Anastasi, 1982, 1985, and 1997; Kuder & Richardson, 1937; Cronbach, 1951; and Herrera & León, 2022)
* * Validity: What does a test measure? (Anastasi, 1982, 1985, and 1997; Rose, 1993; American Psychological Association (APA) et al., 1974; and Herrera & León, 2022)
* * Factor Analysis (Fabrigar, Wegener, MacCallum, & Strahan, 1999; and Herrera & León, 2022)
* * The Classical Test Theory (Allen & Yen, 2002)

Theoretical considerations

The tests that are commonly applied in personnel selection have mostly been constructed from an inductive and empirical perspective, supported by the classical test theory or CTT (Nunnally, 1978), which starts from the elaboration of item banks and the content and statistical analysis, as occurs in the cases of the inventory and profile of the salesperson or IPV (Manual Moderno, 2016), the big five questionnaires or BFQ (Barbaranelli & Caprara, 2000), Gordon's personality profile and inventory (Gordon, 1994), the Minnesota Multiphasic Personality Inventory or MMPI (Zambrano-Guerrero, Caicedo-Padilla, and Matabanchoy-Tulcán, 2015), except for some cases derived from a theory such as the Myer-Briggs typological inventory test or MBTI (McCaulley & Martin, 1995). The factors identified by statistical analysis are called constructs or latent variables and give rise to theoretical propositions. The test in this paper also derived from a qualitative exploratory, inductive approach, and the classical test theory is a model that establishes as a first step the identification of behaviors, attitudes, and beliefs associated with previously observed characteristics, such as the case of successful salespeople.

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this work also derives from an exploratory, inductive and qualitative approach, and the classical theory of evidence is a model that establishes as a first step the identification of behaviors, attitudes and beliefs associated with previously observed characteristics, as is the case of successful salespeople.

Novak (1966) introduced the classical theory of tests, but Spearman, in 1904, was the first to decipher the influence of measurement error and propose the calculation of reliability. Later, Lord and Novick (1968), Nunnally (1978) and Allen and Yen (2002) explained the theory in detail.

In summary, the test design was based on an exploratory and inductive approach and was conducted in accordance with classical test theory. In the initial stages, no particular theory was considered, and in the final stage, the relationship between 15 items was examined and the emerging construct was proposed to be named "optimism." However, now it is time to describe the research methodology followed for the design of the salesperson test, in accordance with classical test theory.

Method

Research design

This research is mixed since the data were collected through individual interviews and focus groups, examination of job applications and application of a standardized online questionnaire; consequently, it uses a qualitative phenomenological technique and a correlational study that seeks to establish the relationship between variables.

Procedure and time-space framework

Eight stages are presented, which began in 2016 and concluded in 2018, and were carried out in the distributor's offices and agencies in Mexico, Querétaro and Hidalgo. The initial contact was the human resources director, who requested advice to design a valid test to select vehicle sellers and address the high level of voluntary staff turnover.

The study was conducted in eight stages:

Stage 1 (2016, January): Familiarization with the talent acquisition process through a focus group with the human resources department.

Stage 2 (2016, February and April): Focus groups and interviews with salespeople, managers, and executives in the State of Mexico, Querétaro, and Hidalgo.

The qualitative method was based on conducting unstructured individual interviews and seven focus groups (2016) with 5 managers, 8 human resources representatives, 13 agency managers, and 41 salespeople working in the corporate offices and 7 agencies. Records (job applications) of the 100 best salespeople in terms of commissions and the 100 worst salespeople were also analyzed to discover possible demographic characteristics that differentiate successful salespeople.

Stage 3 (2016, May): Evaluation of the instruments used to select sales representatives. The validity of the tests applied in 2015 and 2016 (Cleaver, Terman, and PIPG) in the selection of 147 sales representatives was analyzed, and it was found that their correlation with average daily sales commission is not relevant. This finding confirms the need to design a customized test and conduct the study.

Stage 4 (2016, June): Design of the screening instrument according to the 11 constructs identified in the qualitative research.

Stage 5 (2016, July): Administration of the online test to active salespeople. Based on the findings of the qualitative method, the quantitative method consisted of implementing a standardized questionnaire with 11 factors and 63 items.

Stage 6 (2016, August): Analysis of the tool's effectiveness in terms of reliability and validity.

Stage 7 (2016, September to September 2018): Administration of the 63-item test to new candidates.

Stage 8 (2018, October): confirmation of the validity of the test 2 years after its use (sample of 415 salespeople hired in 2016, 2017, and 2018).

Qualitative results

The following paragraphs present the eleven constructs identified in the focus groups, interviews, and job applications. Based on them, 63 Likert-type items were written, five or six for each of the eleven constructs, to conduct the quantitative research. The study aims to design a valid and reliable motor vehicle salesperson scale by classical test theory, as explained, and the factors and the reasons for their identification are described below. The constructs associated with sales success are locus of control, self-efficacy, self-monitoring, resilience, extraversion, open-mindedness, emotional stability, conscientiousness and achievement motivation, power, and affiliation.

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efficacy, self-control, resilience, extraversion, open-mindedness, emotional stability, concientiousness and achievement, power and affiliation motivation.

Internal locus of control

In 1966, Rotter proposed the construct that stems from the assertion that successful people, and consequently successful salespeople, have control over the process and closing of the sale. It depends on them rather than on circumstances. This trait describes people who perceive that most achievements and events depend on their behavior, skills, and knowledge; internal locus of control is a belief that the person is in control of his or her life and therefore attributes his or her achievements and failures to himself or herself. On the other hand, people characterized by an external locus of control hold that success and failure are the result of luck or external factors beyond their control. An example of a statement item is: Most of the sad situations that occur in people's lives are due, in part, to bad luck.

Self-efficacy

Interviews and focus groups reveal that a successful salesperson is one who considers to be competent and possesses the necessary skills to sell. The concept of self-efficacy expectancy (Bandura, 1977) refers to the belief in one's ability to adequately manage specific goals and life stressors. Self-efficacy expectancy can influence feelings, thoughts, and actions. People with low expectations tend to display low self-esteem and negative feelings about their abilities. Regarding thoughts, perceived self-efficacy facilitates cognitions regarding one's own abilities, and these thoughts act as motivators for action. An example of a formulated item is: I can find a way to get what I want, even if someone opposes it.

Self-monitoring

Interviewees affirm that successful salespeople correctly perceive customer expectations and know how to act flexibly and consistently with their expectations. Self-monitoring is a personality trait that refers to the ability to regulate behavior to adapt to social situations (Snyder, 1974; Snyder & Gangestad, 1986). Individuals who closely monitor themselves are classified as high self-monitors and often behave in a manner that is highly responsive to social cues and their situational context. Those with high self-monitoring can be considered social pragmatists who project images to impress others and receive positive

feedback. In contrast, those with low self-monitoring do not engage in expressive monitoring to the same degree nor do they share a similar concern for situational relevance.

People with low self-monitoring tend to exhibit expressive control consistent with their internal states, beliefs, attitudes, and dispositions, regardless of social circumstances. They tend to be less observant of the social context and consider expressing an image different from their internal states to be undesirable falsehood. Therefore, they are unwilling to self-monitor or adjust their behavior accordingly. They are often aggressive, stubborn, and insistent with others. An example of a formulated statement is: I find it difficult to imitate the behavior of others.

Resilience

Interviews and focus groups reveal that a successful salesperson is a person who views himself or herself as competent and has the skills necessary to sell. The concept of self-efficacy expectancy (Bandura, 1977) refers to the confidence in one's abilities to adequately handle specific goals and life stressors. Self-efficacy expectancy can influence feelings as well as thoughts and actions. People with low expectations tend to show low self-esteem and negative feelings about their abilities. Regarding thoughts, the perception of self-efficacy facilitates cognitions that refer to one's abilities, and these thoughts act as motivators for action. An example of a formulated item is: I can find a way to get what I want, even if someone opposes me.

Extraversion

Salespeople have been described as sociable and social, and in some cases have become friends to such an extent that their clients invite them to meetings, parties, birthdays, and funerals. Extraversion is a typical trait characterized by concentration of interest on an external object. Extroverts are interested in the external world of people and things; they try to be more friendly and aware of what is going on around them. They are cordial, sociable, assertive, active, and thrill-seeking (Costa & McCrae, 1992). In this context, they are called dynamic, active, dominant, bold, go-getters, the opposite of underachievers. Extroverts can be described by their dynamism and dominance, where dynamism refers to energetic and dynamic behaviors, while dominance describes the ability to assert oneself. An example of a statement item is: I like meeting and dealing with new people.

Open-mindedness

Another trait that emerges from the interviews and focus groups is the flexibility to help customers with diverse characteristics and attitudes, even customers who appear to lack sufficient resources to purchase a vehicle because of their way of dressing and speaking. People who score high in this category are cultured, informed, interested in new things and experiences, and open to contact with diverse cultures (Costa & McCrae, 1992). Openness to culture indicates an interest in reading, acquiring knowledge, and staying informed. Likewise, open-mindedness refers to a positive attitude toward new things, perspectives, cultures, styles, values, and ways of life. People who score low in open-mindedness are considered closed to experience and tend to be conventional in their attitude and behavior. They prefer familiar routines to new experiences and generally have a narrower range of interests. Openness has moderate positive relationships with creativity, intelligence, and knowledge. An example of an item is: Everything new excites me.

Emotional stabilityxxx

Interviews and focus groups indicated that a good salesperson is a keen observer who inquires about customers' needs and desires and avoids closing a sale impulsively. Emotional stability is a trait related to the control of states of tension that arise from emotional experiences and the ability to maintain control even in circumstances of conflict, danger, or discomfort (Costa & McCrae, 1992). Emotional stability refers to a person's ability to remain stable and balanced. At the other end of the scale, a person with a low level of stability tends to experience negative emotions easily. An example of a formulated statement is: I worry and feel very nervous in emergencies.

Conscientiousness or responsibility

In interviews, successful salespeople are described as tenacious and persistent, taking charge of the process, beginning with an inquiry into the customer's needs and interests, proposing and demonstrating appropriate vehicles, proposing different purchase plans, and closing the sale or subsequent follow-up. There are also anecdotes from salespeople who have sold to grandparents, parents, and children, providing reminders about when maintenance is due, checkups, payment of maintenance fees, and offers on new vehicle models. The trait of conscientiousness can be defined by conscientiousness and perseverance. The former consists of meticulousness, love of order, and reliability; the latter refers to the conscientiousness

and persistence with which people perform their tasks (Costa & McCrae, 1992). An example of a stated item is: I tend to leave most of my activities to the last minute.

Achievement motivation

One of the primary motivations of salespeople is achieving monthly vehicle sales goals and the associated commissions. Salespeople are aware of their objectives, their own sales, and those of their colleagues. The need for achievement drives the desire to excel and strive for success. People with a predominant need for achievement seek challenging tasks (neither too easy nor too complex), reject gambling, and prefer to be in control (McClelland, 1988). An example of an item is: I like being assigned complex tasks.

Need for power

In the interviews and focus groups, it was stated that the role of salesperson carries prestige with family, friends, and the distributor, since sales work is a difficult skill that few people can master. This need motivates individuals to get others to behave differently from their natural behavior. It is the desire people have to control the means that allow them to direct, influence, and dominate others (McClelland, 1988). An example of an item used is: I like the idea of being a boss.

Need for affiliation

Finally, this need also characterizes successful salespeople, given that it was frequently mentioned in the interviews that a good salesperson is someone who easily establishes social relationships, lasting relationships based on trust and friendship, which they manage to consolidate with the client. The need for affiliation is an impulse that drives a person to relate to others; it is a social need. For McClelland (1988), it is a critical need, since people with a predominance of the need for affiliation are characterized by showing great concern for the recognition of others and preferring group work. They are more likely to be assigned teamwork, where maintaining relationships is more important than making decisions and achieving goals. Interest in affiliation is considered important for understanding the needs of others and creating a favorable work environment. Therefore, employees with a high need for affiliation seek satisfaction in social and interpersonal activities. An example of a formulated item is: I like being in the company of those who work with me.

Following the definitions in the previous paragraphs, the eleven scales were designed by writing 63 items, 45 positive and 18 negative (to be recoded), according to the 5-interval Likert-type scale, where 5 is the pole of high appreciation (totally agree).

Quantitative results

Demographics

This section describes the characteristics of 453 salespeople hired between 2016 and 2018 in terms of their age (mean 36.9 years and standard deviation 11.9 years), gender, and the brand they were hired for. Table 1 shows that the top three brands (whose data are kept confidential at the distributor's request) account for the largest share of salespeople (85.4%), and that women represent 34.5% of the workforce.

Table 1
Make and Gender

Make	Female	Male	Total	Percent
1	51	112	163	36.0
2	43	71	114	25.2
3	40	70	110	24.3
4	8	13	21	4.6
5	5	14	19	4.2
6	4	7	11	2.5
7	2	5	7	1.5
8	1	3	4	0.09
9	2	1	3	0.7
10	0	1	1	0.2
Total	156	297	453	100

Source: created by the authors

Criterion and factorial validity of the 11 factors

In order to test the predictive validity of the 11 factors measured by 63 items, the test was administered to 453 candidates between 2016 and 2018. The test results were correlated with the salespeople's average daily commission, which was achieved six or more months after hiring. No correlation achieved significance at the .05 level or lower; therefore, it was decided to perform an exploratory factor analysis to identify associated underlying factors using principal component extraction and varimax rotation.

In Table 2, a main factor was identified in which 15 items load, and the Kaiser-Meyer-Olkin tests of sampling adequacy and Bartlett's Sphericity obtained satisfactory results of .964 and 4 252.3 (p =

.000); the variance explained is 55.4%; the factor loadings of the items range from .898 to .318, according to the order presented in Table 2. It is worth mentioning that four items correspond to emotional stability (ES), three to locus of control (LC), three to extraversion (EX), two to conscientiousness (TE), one to open-mindedness (AM), one to resilience (RE) and one to self-monitoring (AUM). It should be noted that 14 items go in the opposite direction to the measured factor, and only item EE2r.16 positively measures emotional stability. Nonetheless, this item is recorded to add it to the other 14 items and obtain a total score whose minimum possible score is 15 points and the maximum score is 75 points. According to Table 3, the minimum score observed is 15, the maximum score observed is 73, the mean is 48.1, and the standard deviation is 15.5. The reading of the 15 items reveals that due to their interrelation, they refer to a construct called optimism, which is explained below.

To test the predictive validity of the 11 factors measured by 63 items in Spanish, the test was administered to 453 candidates between 2016 and 2018. The test results were correlated with the salespeople's average daily commission, obtained six or more months after hiring. No correlation reached a significance level of 0.05 or lower; therefore, it was decided to conduct an exploratory factor analysis to identify the underlying associated factors using principal components extraction and varimax rotation.

In Table 2, one main factor was identified with a loading of 15 items, and the Kaiser-Meyer-Olkin sampling adequacy test and Bartlett's sphericity test yielded satisfactory results of 0.964 and 4252.3 (p = 0.000); the explained variance was 55.4%. The item factor loadings range from .898 to .318, according to the order presented in Table 2. It is worth mentioning that four items correspond to emotional stability (ES), three to locus of control (LC), three to extroversion (EX), two to conscientiousnes(C), one to open-mindedness (OM), one to resilience (RE), and one to self-monitoring(SM). It is worth noting that 14 items are contrary to the measured factor, and only item EE2r.16 positively measures emotional stability. However, this item is recorded to add it to the other 14 items and obtain a total score whose minimum possible score is 15 points and the maximum is 75 points. According to Table 3, the minimum score observed is 15, the maximum score observed is 73, the mean is 48.1, and the standard deviation is 15.5. The reading of the 15 items reveals that due to their interrelation, they refer to a construct called optimism, which is explained below.

Table 2
The 15 items and keys

Key	Item
EE4r.34	When I am faced with a problem, I explode easily
LC1r.1	Most of the sad situations that occur in life are due in part to bad luck
EX6r.50	I do not usually initiate conversations
C2r.17	I am not usually punctual for my appointments or meetings
EX3r.23	It makes me uncomfortable when people pay too much attention to me
C1r.8	I tend to leave most of my tasks to the last minute

EE3r.25   Other people consider me to be very sensitive because I cry easily
LC6r.46   I often feel that I have little influence over the things that happen to me
EX7r.57   I prefer to spend my free time alone
OM5r.62   I am not very attracted to new and unexpected situations

LC4r.28   Success often depends on having the good fortune of being in the right place first

EE1r.7   In emergencies, I worry and feel very nervous
RE6r.49   I have had problems that have affected my professional development
EE2r.16   I get very interested and concerned when someone tells me about a problem ®
SM5r.3   In a group of people, I am rarely the center of attention

Source: created by the authors

Table 3
Minimum and maximum score, standard deviation, and mean of the 15-item factor

N	Minimum	Maximum	SD	Mean
415	15	73	15.5	48.1

Source: created by the authors
Note: out of 453 vendors, full scores were obtained from 415 vendors

According to the mean reported in Table 3 and Figure 1, two bell curves are observed, separated by an intersection at 48 points; 48 points is proposed as the cutoff point. Salespeople with low average commissions obtain high scores on the test, and salespeople with high average commissions have low scores on the test. Salespeople with low average daily commissions are located in the right bell, and salespeople with high average daily commissions are in the left bell.
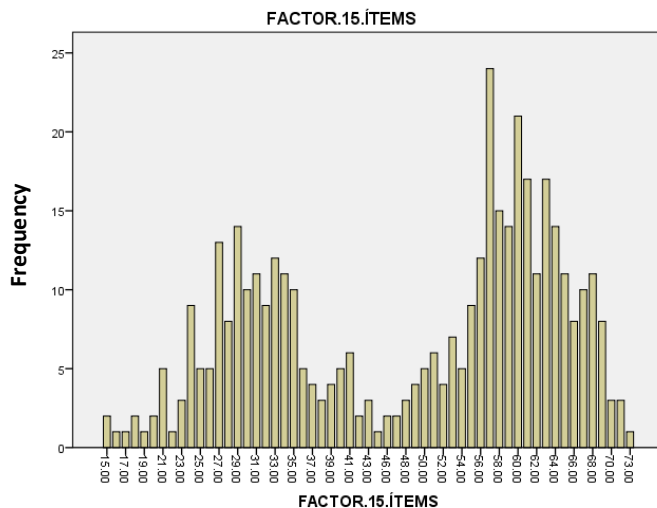

Figure 1. Distribution of the scores obtained in the 15-item Factor
Source: created by the authors

Nevertheless, the correlations between Factor 1 (15-item test) and average daily commissions are:

-.41** Total (N = 415)

-.43** Make 1 (N = 163)

-.50** Make 2 (N = 114)

-.37** Make 3 (N = 110)

Other 7 makes (N = 28, samples too small to calculate correlations)

In all cases, the correlations are significant (** $p < .01$), thus confirming that the 15-item test has construct and criterion validity. Figure 2 shows the correlational dispersion between the test score (horizontal axis) and the average daily commission (vertical axis). Each point represents one salesperson or more salespersons: the higher the test score, the lower the commission.
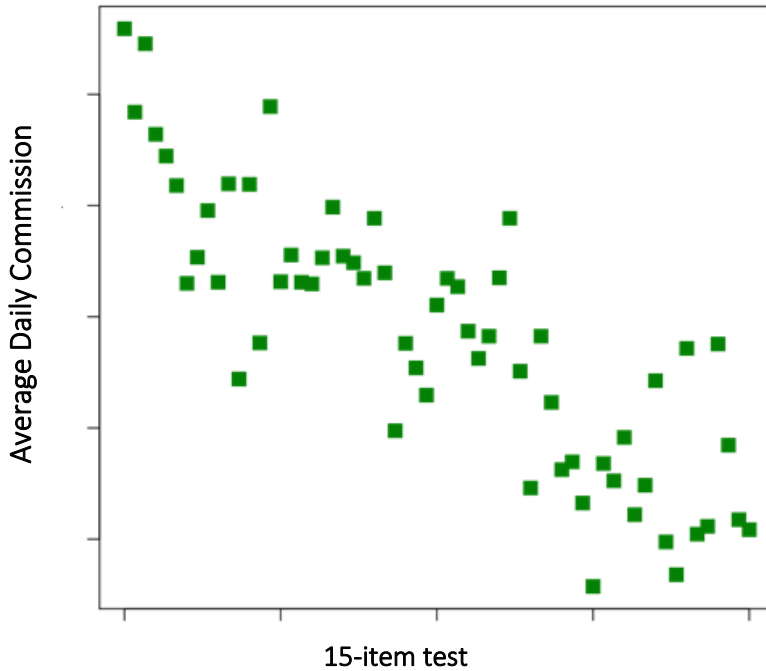

Figure 2. Dispersion of scores obtained in the 15-item test (X-axis) and average daily sales commissions (Y-axis)
Source: created by the authors

Taking into account Table 3 and Figure 1, Table 4 compares the average daily commissions of salespeople scoring below 48 and above 48. The 243 salespeople who score above 48 points on the 15-

item test have an average daily commission of MXN 209.60, and the 172 salespeople who score below 48 points have an average daily commission of MXN 534.80, which is a 2.55 times higher commission gain.

Table 4
Average daily commission of salespeople who score 48 or more points on the 15-item test and salespeople who score less than 48 points

Test points	N	Mean MXN
>= 48	243	$209.60
< 48	172	$534.80

Source: created by the authors

Reliability cronbach's alpha and standard error of the measure

Regarding reliability, the obtained coefficient of .94 is highly satisfactory (Table 5), and the standard error of measurement (SEM) is 3.8 or 4 rounded points (for the reliability of .94 and the standard deviation of 15.54); two standard errors of measurement (recommended to have a 95% confidence interval) is 7.6 or 8 rounded points of measurement error.

The SEM was calculated using the following formula:

$$SEM = SD\ \sqrt{1 - r}$$

(1)

SEM is the standard error of measurement; SD is the Standard Deviation, and r is the reliability coefficient. When calculated, the SEM is expressed in the same units as the test scores. Therefore, if the 2SEM is applied, 8 points should be subtracted and added to the score obtained by a sales candidate to interpret and predict their sales potential.

Table 5
Reliability of the 15-item test

Cronbach's alpha	N de items
0.94	15

Source: created by the authors

Norms (percentiles)

Table 6 shows the percentiles corresponding to the scores obtained in the 15-item test. It should be remembered that high scores correspond to low commission performance, so scores of 48 points or less correspond to salespeople who have higher average daily commissions. Another appropriate way to

interpret the table is to consider it as a pessimism scale, where an applicant who scores more than 48 points is considered pessimistic, and applicants with 48 points or less are considered optimistic.

Table 6
Percentiles

Test points	Percentile	Test points	Percentile	Test points	Percentile
15	1	34	30	54	50
16	1	35	33	55	52
17	1	36	34	56	55
18	1	37	35	57	61
19	2	38	35	58	64
20	2	39	36	59	68
21	3	40	38	60	73
22	4	41	39	61	77
23	4	42	40	62	79
24	7	43	40	63	83
25	8	44	41	64	87
26	9	46	41	65	89
27	12	47	41	66	91
28	14	48	42	67	94
29	17	49	43	68	96
30	20	50	44	69	98
31	22	51	46	70	99
32	25	52	47	72	100
33	28	53	48	73 or more	100

Source: created by the authors

Voluntary staff turnover

Table 7 presents the ratio of annual voluntary staff turnover from 2013 to 2018, which excludes departures due to dismissal, disability, retirement, or death and includes departures due to resignation or abandonment of work; the ratios appear in the last column, for example in 2013, 4.3 salespeople resigned or abandoned their job for every salesperson hired. There is a consistent downward trend in the staff turnover ratio, with 2018 being the lowest. The main reasons for the drop are better recruitment measures, which consisted of recruiting at least three applicants per vacancy and applying the new test.

Table 7
Voluntary staff turnover

Year	Hirings (A)	Resignations (B)	B/A ratio
2013	15	65	4.3
2014	14	114	8.1
2015	34	98	2.9
2016	44	74	1.7
2017	69	60	0.9
2018	60	25	0.4

Source: created by the authors

Finally, a LISREL confirmatory factor analysis was performed with a sample of 224 aspiring salespeople to corroborate the findings of the exploratory factor analysis. The statistics and Figure 3 confirm that the fifteen items are grouped into one factor; an acceptable relative Chi-square of 1.93 was obtained since it falls between a rank of 2 to 1; this Chi-square is obtained by dividing the Chi-square of 164.31 by 85 degrees of freedom; the following statistics are also interpreted as acceptable: RMSEA = .06, NFI = .96, CFI = .98 and GFI = .91.
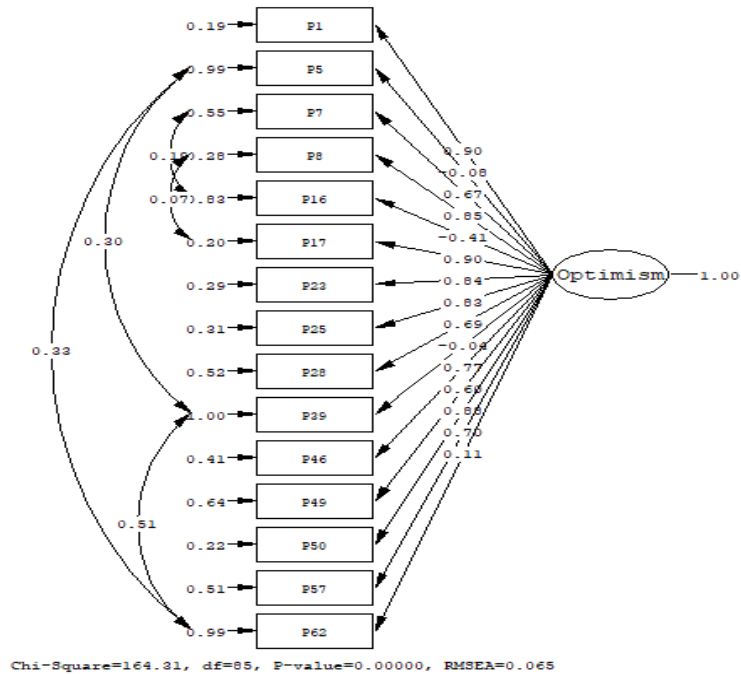

Figure 3. Confirmatory factor analysis. The 15 items are identified with rectangles and the letter P. The numerical order of the items is respected, as presented in Table 2
Source: created by the authors

Conclusions

The objective of this research was to describe a procedure for designing valid and reliable tests through a mixed-methods approach to constructing a salesperson selection test for a national motor vehicle distributor. In 2016, the dealer experienced an undesirable voluntary turnover rate of 8.1 salespeople per year in 2014. The salesperson selection tests (Cleaver, Terman, and PIPG) were unrelated to the average daily sales commission. Interviews and focus groups were conducted with the distributor's salespeople, managers, and directors, and the files of successful and unsuccessful salespeople were analyzed to identify the characteristics of successful salespeople in terms of their superiors' appreciation and the commissions received. The results identified eleven constructs associated with success, and 63 items were written according to a Likert scale.

The 63-item test was administered online to 453 salespeople hired in 2016, 2017, and 2018, and their commissions were recorded to calculate an average daily commission. In none of the eleven factors were significant correlations with the average daily commission obtained, and the decision was made to conduct an exploratory factor analysis with the 63 items. The factor analysis revealed that 15 items loaded on a single factor, and the sum of the items achieved a significant correlation of -.41 with the average daily commission received for sales and a high reliability of .94. Therefore, it is concluded that this is a valid and reliable sales test. A confirmatory factor analysis corroborated the findings of the exploratory study..

A review of the 15 items reveals the emergence of an unexpected construct, termed "optimism." The items are related and characterized by the expression of enthusiasm and hope in the face of personal and interpersonal problems and obstacles; sad situations; challenges and the time required to attend to responsibilities; and sensitive and delicate situations (Table 2). Wrosch and Scheier (2003) reviewed the literature and found that optimism facilitates subjective well-being and health, mediated by personal coping behaviors. The authors also consider other studies examining individuals facing difficult goals; the evidence reported supports the conclusion that individual differences in adapting to difficult goals are associated with good quality of life and points out that there are different approaches to studying optimism. One approach has assessed optimism in terms of attributional styles: how a person explains past events.

The other approach defines optimism as a relatively stable generalized expectation that good outcomes will occur over a lifetime. The important part of the definition is the stability of the expectation. People maintain their optimism over time and across different situations. Therefore, optimism is a general tendency that reflects expectations in various facets of life. In line with this definition, Maury-Ortiz et al. (2014) conducted research with 320 workers working in three different locations of a manufacturing company in Puerto Rico, and their study identified a positive and direct relation between optimism,

resilient personality, and work engagement. In another study, Pedrosa et al. (2015) found that the correlation of optimism with other personality traits is high and positive, traits that were identified in the interviews and focus groups of the present research. The authors obtained significant correlations with emotional stability (.62) and responsibility (.33) and found that both traits correlate meaningfully with agreeableness and extraversion in a study conducted with 2 693 young Spaniards.

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In summary, the three studies mentioned above support the thesis that optimism is related to career success and also to professional and personal well-being. Therefore, it is useful to continue investigating its relationship in the case of salespeople and other occupations, and to develop a theory that explains how optimism affects sales performance and performance in different occupations. Regarding the test design, it is observed that salespeople who scored 48 points or lower have an average daily commission 2.5 times higher than those who scored 48 points or higher. The bimodal distribution of the test scores is striking, with two curves intersecting at 48 points. Considering that the items are written in a negative or inverse sense (pessimism), successful salespeople are characterized by being emotionally stable, having an internal locus of control (success or failure depends on themselves), being extroverted and responsible, having a flexible, open-minded approach to new experiences and types of clients, being resilient in the face of adversity, and being able to modify their behavior according to client expectations. This, from a global perspective, characterizes optimistic salespeople. Finally, a subsequent finding was a reduction in voluntary staff turnover, attributable to better recruitment procedures and test administrations.

As a theoretical discussion, the reader is reminded that the research started from a purely exploratory and qualitative stance; there was no model or theory to explain people's performance in sales positions. The literature review identified two tests that claim to predict sales success (IPV and 16PF), but neither test is theory-based. They do not offer criterion validity (the relation of test results to objective sales performance measures). This lack led the researchers to identify factors underlying sales

performance through interviews, focus groups, and document analysis. Initial findings revealed eleven personality factors possibly related to performance. Nevertheless, none correlated with a sales commission, i.e., they lack criterion validity.

As a theoretical analysis, the reader is reminded that the research began from a purely exploratory and qualitative perspective; there was no model or theory to explain people's performance in sales positions. The literature review identified two tests that claim to predict sales success (IPV and 16PF), but neither is based on theory. They lack criterion-related validity (the relationship between test results and objective measures of sales performance). This lack led the researchers to identify the factors underlying sales performance through interviews, focus groups, and document analysis. Initial findings revealed eleven personality factors possibly related to performance. However, none correlated with sales commission; that is, they lack criterion-related validity.

Therefore, it was decided to conduct an exploratory factor analysis with the 63 items from the eleven factors; this is also an exploratory approach commonly used by test designers and led to the identification of 15 items that, in the authors' opinion, are associated with the construct "optimism." A confirmatory factor analysis supported this finding. The construct "optimism" proposes a hypothetical explanation for why salespeople exhibit outstanding performance and likely why other types of employees excel in positions other than sales. As mentioned, optimism characterizes people with strong and enduring beliefs and convictions about achieving activities and goals—in this case, work-related goals; they are confident in their competencies, set realistic and challenging goals, show persistence and responsibility, and overcome obstacles. This hypothetical position needs to be confirmed by replicating this research with other samples of salespeople, with other indicators of success, and by building a theoretical model. Bandura (2012) explains the development of self-efficacy and optimism by stating that a) relationships with successful role models (people); b) personal success in performing activities; c) positive feedback from relevant people (such as bosses and peers); and d) health are fundamental. Therefore, a question for future research is how these four factors develop and are associated with optimism.

Limitations

One limitation to consider is the external or generalizability validity of the 15-item test (Anastasi, 1997); the validity obtained in this study is likely to apply only to selected salespeople from other distributors or other types of salespeople promoting different goods and services. Therefore, it is advisable to evaluate its validity in other samples of salespeople and observe its effectiveness in the long term. For example, Ghiselli (1959 and 1966) observed that, when he first correlated standardized aptitude tests with performance in presumably similar jobs in industrial validation studies, he found that validity coefficients

varied widely. As a result, Schmidt, Hunter, and their colleagues were able to demonstrate that the validity of verbal, numerical, and abstract reasoning tests can be generalized to other occupations (Pearlman, Schmidt, & Hunter, 1980; Schmidt, Gast-Rosenberg, & Hunter, 1980; and Schmidt, Hunter, Pearlman, & Shane, 1979). Another area for improvement that affects the validity of the study is that this research was conducted before the pandemic; consequently, it is necessary to replicate the research with other samples in the post-pandemic era.

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