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Impact of Co-Worker Support and Supervisor Support Among the Middle and Senior Management in the Manufacturing Industry

SHARON MACIAS-VELASQUEZ¹, YOLANDA BAEZ-LOPEZ¹, DIEGO TLAPA¹,
JORGE LIMON-ROMERO¹, AIDÉ ARACELY MALDONADO-MACÍAS²,
DORA-LUZ FLORES¹, AND ARTURO REALYVÁSQUEZ-VARGAS³

¹School of Engineering, Architecture, and Design, Autonomous University of Baja California, Ensenada 22860, Mexico

²Department of Industrial and Manufacturing Engineering, Autonomous University of Ciudad Juárez, Chihuahua 32310, Mexico

³Department of Industrial Engineering, Mexico National Technology Institute/Tijuana Institute of Technology, Tijuana 22414, Mexico

Corresponding authors: Yolanda Baez-Lopez (yolanda@uabc.edu.mx) and Jorge Limon-Romero (jorge.limon@uabc.edu.mx)

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ABSTRACT The purpose of this research work was to evaluate the impact of social support (through its two dimensions: co-worker support and supervisor support) on the reduction of the burnout syndrome (considering its three dimensions: emotional exhaustion, professional efficacy, and cynicism) from two proposed models that show clear differences. Social support was assessed using the Job Content Questionnaire instrument, and the burnout syndrome was measured through the Maslach Burnout Inventory - General Survey. A total of 467 middle and senior managers from the Mexican manufacturing industry participated in the research. Structural Equation Modeling was used to determine the relationships between the proposed variables. The results of model one show that social support helps mitigate the effects of burnout syndrome in its three dimensions. On the other hand, model two features better fit indices and specifically shows that co-worker support has a direct negative relationship with the dimension of emotional exhaustion, while supervisor support directly and negatively affects cynicism. These results show that, although social support helps in the mitigation of burnout syndrome in general, each type of support separately has a direct impact on a specific dimension of the burnout syndrome. Clarifying these relationships will help in the proposal of occupational hazard management policies in the Mexican industrial sector.

INDEX TERMS Burnout, co-worker support, manufacturing industry, middle managers, senior managers, social support.

I. INTRODUCTION

Work is an essential part in the life of every human being. It is considered beneficial for mental health as it contributes to the attainment of social well-being [1], [2]. Additionally, it provides opportunities for interaction with other members of society, which is crucial to individuals' feelings of integration and their learning processes, as well as to the development of a positive organizational culture [3], [4]. Thus, a company's

social environment has an important effect on the quality of work of its employees [3].

Over the past century, the development of a positive culture in the workplace, with the purpose of improving well-being and worker output, has become the subject of several disciplines, from psychology to human resource management [3], [5].

Social support is a highly communicative transaction between individuals who want support and those who provide it [6]. In most organizations, individuals provide and receive informational support (messages to improve problem awareness) [4], instrumental support (physical assistance provided

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by coworkers), and emotional support (interactions to boost coworkers morale) [6].

It is a well-known fact that people spend a large portion of their time at work; therefore, a negative work environment can lead to physical [7] and mental health problems [1], [2], [8].

While supervisor support has undeniable beneficial effects on relieving employee stress, it also has the potential to make matters worse when such support comes from the same source as the stressor [9].

Although there is no universal ranking, there are important differences by sector and occupation in terms of the best social environment at work. For example, managers have a fairly good level of support in the European Union, Turkey, China, and the Republic of Korea, but not so in the US, where they consistently give their own management particularly low scores. In Uruguay, workers in the construction and primary sectors feel more supported by their colleagues, whereas in China, the Republic of Korea and Chile, workers in larger organizations report higher support and better management quality overall compared to those in smaller companies [3].

Furthermore, in the industrial sector's work environments, some of the most frequent social behaviors identified as lack of support are verbal abuse and humiliation [3].

Among the Mexican working population, social support from supervisors and co-workers has been found to indirectly stimulate well-being by impacting on job satisfaction and commitment. Such indirect effects confirm the importance of employees' perceptions of development support from their co-workers and supervisory mentors in promoting work engagement [10].

Today, guaranteeing safe and productive workplaces has become increasingly important for both national and international organizations. For example, the International Labor Organization, has already included this matter in the 2030 United Nations Agenda for sustainable development [3].

In this regard, Mexico has not been the exception. In October 2018, the Official Mexican Standard NOM-035-STPS-2018 was published in the Federation's Official Gazette, under the title: Psychosocial risk factors at work - Identification, analysis, and prevention. The document established provisions that must be adopted in the workplace to identify and prevent psychosocial risk factors, as well as to promote a positive organizational environment.

In this research study, the population of interest was the personnel of the Manufacturing, Maquiladora, and Export Service Industry in Mexico (IMMEX) as this sector contributes to the Mexican economy by strengthening the competitiveness of Mexico's export sector, as well as by reducing logistics costs, which promotes investment attraction and retention in the country. The number of people employed in IMMEX companies in the manufacturing industry segment increased by 0.6%, with 14,913 new jobs in 2020; currently, the number of people employed totals 2,690,635 workers nationwide [11].

This study was conducted in Baja California, Mexico, due to the advantages that the border region offers and the success of the maquiladora activity in the area. Previously, the predominant investment came from the United States, due to the proximity to that country, but in recent years Asian and European investments have gained special momentum in further boosting the region's commercial activity and economic development [12].

In addition to its territorial advantages, Baja California features the highest number of IMMEX companies (17.8%), and according to the latest 2021 report [13] it ranks second in the nation in terms of personnel employed (13.2%).

In light of the boost in the export-related productive activity, the Baja California government is working to address issues to bring about proper performance of IMMEX companies in the state, for example the development of support programs for workers in the sector. That is why conducting the study in Baja California was thought to be of greater impact on the research as this state has the highest number of IMMEX employees in the country, the state's industrial activities have been on a growing trend, and the sector has been little explored in this worldwide issue.

From the academic perspective, the research contributes to the state of the art in a general way by considering an aspect of worldwide interest that impacts on the quality of work life as it results in safer, healthier, more productive, and more satisfied employees, as well as a competent, adaptable, and productive organization [8].

The uniqueness of the research lies, on the one hand, on the fact that most of the studies in the literature review that comprises this work's theoretical framework deem social support as a single concept as shown in [6], [14]–[18]. In those works, it is not possible to notice the specific impact of supervisor and co-worker support on burnout syndrome. This research study, however, draws a comparison between two models to clarify the proposed relationships. Another outstanding aspect is that studies have thus far focused mainly on burnout among health professionals and teachers in the Mexican population [19]. However, research on burnout among middle and senior managers in the industrial sector has been scarce, as this population has hardly been approached and explored due to restrictions imposed by internal company policies.

II. THEORETICAL FRAMEWORK

One of the most influential theories in predicting negative consequences on workers' mental health is Karasek's Demand-Control-Support model (DCS). The psychosocial risks described in the DCS model include psychological job demands (workload, work pressure), work decision latitude (workers' control over their tasks), and social support from colleagues and supervisors [20]. According to the DCS model, jobs with high levels of demands, low work control, and low social support pose a high risk of disease and chronic ailments [14]. Furthermore, these characteristics lead to a classification of the work environment [21].

While positive relationships and co-worker support improve the work environment in general, they have also been associated with physical well-being aspects such as favorable responses from the immune system, cardiovascular health, and stress [22] and fatigue reduction among the workforce [23], [6].

Several studies have shown that occupational stress factors such as a difficult physical environment, high job demands, insufficient job control, inadequate social support, job insecurity, organizational injustice, lack of rewards, and discomfort in occupational climate can result in depressive symptoms [24] or predict the occurrence of stress-related disorders in the industrial sector [20].

Moreover, the constant social interactions in a person's job make social support an important factor in the work environment. A few studies have reported that this type of support has an impact on stress and burnout among health professionals [25], teachers [15], and workers in general [26].

Munir *et al.* [27] mentions that in addition to being related to personality factors, burnout affects workers' mental health. For [28], burnout may be a result of the high work demands and the level of social support received by the worker, while Yang *et al.* [29] report that co-worker and supervisor support have a significantly negative effect on job stress among the aging workforce.

The relationships between social support and burnout have also been of interest considering the three-dimensionality of burnout. Nie *et al.* [16] conducted a study among nurses, which showed that the depersonalization dimension had a negative correlation with social support, while the personal achievements dimension was positively associated with social support. Finally, no relationship was found between the emotional exhaustion dimension and social support. The results suggest that an increase in social support is a good way to reduce burnout in nurses. However, for a future line of research, the author recommends exploring what type of social support most directly causes a burnout reduction [16].

Chou *et al.* [25] investigated burnout-related factors and their prevalence in different medical professions. The results showed work stress, excess in commitment, and lack of social support to be the three main variables associated with high levels of burnout. Li *et al.* [30] found that, in a sample of crude oil production workers, social support was negatively related to emotional exhaustion.

In the study conducted by [17], the results pointed to significant relationships between social support and the three dimensions of burnout in the industrial sector. It was especially observed that when more social support is received, emotional exhaustion and attitudes of cynicism decrease. Furthermore, it was found that when more social support is perceived, professional efficacy increases. In general, research establishes that social support can significantly reduce the effects of burnout.

In this research, the sector of interest is comprised by middle and senior managers. Due to the nature of their work, this population can develop high levels of stress, yet their

well-being is crucial for proper company functioning. As part of their job requirements, middle managers must have a university degree. This allows them to start at a mid-level position and not as operators; however, the lack of such previous experience, pressure from their superiors, and the high demands of their position can trigger stress. Additionally, they may face a lack of support from both the subordinates (workers) and the superiors (bosses) with whom their job description requires them to interact. Their well-being is also key because it is the cause of good performance of their functions, which include meeting the needs of the workers they supervise, meeting the constant demands of their superiors, clarifying relevant information at both operational and managerial level, addressing and solving conflicts in the workplace, and even, on occasion, having to operate without prior training [31].

Senior management positions involve facing constant activities aimed at achieving the organization's objectives. This implies making decisions that will lead to either the company's survival or its demise. Therefore, it is the top management's responsibility to be effective and to stay that way; however, having to maintain that level of effectiveness is precisely what triggers the stress process, making it an increasing threat, since companies' success is based partly on the capacity, ability, and well-being of their senior executives [32].

Considering the impact of social support on burnout, this research poses the following 9 hypotheses, comparing 2 different models in middle and senior management within the manufacturing, maquiladora, and export service industry in the state of Baja California, Mexico:

Model 1 Hypothesis 1. Social support has a direct negative effect on emotional exhaustion.

Model 1 Hypothesis 2. Social support has a direct negative effect on cynicism.

Model 1 Hypothesis 3. Social support has a direct positive effect on professional efficacy.

Model 2 Hypothesis 4. Co-worker support has a direct negative effect on emotional exhaustion.

Model 2 Hypothesis 5. Co-worker support has a direct positive effect on professional efficacy.

Model 2 Hypothesis 6. Co-worker support has a direct negative effect on cynicism.

Model 2 Hypothesis 7. Supervisor support has a direct negative effect on emotional exhaustion.

Model 2 Hypothesis 8. Supervisor support has a direct positive effect on professional efficacy.

Model 2 Hypothesis 9. Supervisor support has a direct negative effect on cynicism.

The objective of this research study is to determine whether there is a relationship between supervisor support and co-worker support for each of the 3 dimensions of burnout among IMMEX middle and senior managers. Clarifying these relationships will help improve the workplace's risk management policies, in addition to characterizing a very important sector, which is the industrial sector.

III. MATERIALS AND METHODS

The following sections will describe the materials and methods used.

A. STUDY DESIGN AND SAMPLE

The data collection was carried out inside companies within the industry's manufacturing, maquiladora and export service sectors in the state of Baja California, Mexico. A general questionnaire comprising 4 sections was administered. The sections were: presentation of the project, burnout instrument, social support instrument, and demographic data.

The focus groups consisted of middle and senior managers. Among middle managers were supervisors, group heads, and administrative department personnel, while senior management included general and area managers. The exclusion criteria considered pregnant women and personnel who did not belong to middle or senior management, as well as those questionnaires which were partially or incompletely answered.

The method used for this study was the quota sampling as it is the one that best suits the characteristics of the research population. In this method, the population was divided into quota controls, which were middle and senior managers. Attention centered on quota sampling because, in addition to being an alternative option for reductions in cost and data collection time, it is the non-probability sampling method that some researchers have signaled as competent in producing results equivalent to those obtained by probability sampling [33].

The participating companies were contacted via email, and a face-to-face appointment was made to present the project to the board and/or interested departments.

Project team members visited the companies interested in participating to deliver a printed questionnaire to each worker, as well as to guide them throughout the process in case they had any doubts. The task was carried out by placing workers into groups of up to 15 people. An introductory talk was given to explain them the purpose of the study, the variables of interest, the selection criteria, and the directions to answer each section of the questionnaire. During all the data collection stages, emphasis was made on the fact that participation was voluntary, anonymous, and confidential. Employees were also told that they were free not to participate in the research if they did not wish to do so.

Finally, the participants granted their informed consent in writing; thus, the research was conducted in accordance with the Declaration of Helsinki [34].

B. MEASURES

1) BURNOUT

Burnout is the result of a prolonged response to chronic interpersonal stressors in the job [35]. It is characterized by three dimensions: the first one, emotional exhaustion, refers to physical and emotional fatigue, but the individual does not consider the people around as the source of

these feelings [36]. Rather, as their emotional resources are depleted, workers feel they can no longer give their best psychologically [37]. The second dimension, or professional efficacy, is the tendency to evaluate themselves negatively. In this dimension, workers feel unhappy with themselves and dissatisfied with their achievements at work [37]. Finally, the third dimension, or cynicism, refers to a state in which workers show feelings of indifference or a distant attitude towards work and consider that the source of their feelings is work itself and not the interpersonal relationships within it [36].

In order to measure burnout, this study used the Maslach Burnout Inventory – General Survey (MBI-GS), developed by [37] and characterized by having strong psychometric properties. Its generic reach allows it to be used in any type of profession; however, it has already been validated for samples consisting of middle and senior managers [38].

The specific version used was the one translated into Spanish by Moreno-Jiménez *et al.* [39], which consists of 16 items grouped into the following 3 dimensions: Emotional exhaustion (5 items), professional efficacy (6 items), and cynicism (5 items).

The survey features a 7-point Likert scale-type of answer for each question, where 0 = on no occasion over the course of a year, 1 = very rarely over the course of a year, 2 = on some occasions over the course of a year, 3 = on many occasions over the course of a year, 4 = frequently over the course of a year, 5 = almost every day, and 6 = every day.

High scores on emotional exhaustion and cynicism and low scores on professional efficacy are equivalent to a high degree of burnout [36].

2) CO-WORKER SUPPORT AND SUPERVISOR SUPPORT

The dimension of social support relates to the general levels of social interaction in the form of help received by colleagues and superiors at work [40].

To measure the degree of co-worker and supervisor support, this research used the cultural adaptation provided by an official Spanish version of the Job Content Questionnaire (JCQ) translated by [41], which consists of a self-administered instrument designed to measure social and psychological characteristics of jobs, and which integrates the use of both individual and occupation-based conceptions of job characteristics [42]. The questionnaire included 27 items, which evaluated the following seven scales: decision latitude, composed of the two subscales job skill discretion (six items) and job decision-making authority (three items); job demands (five items); supervisor support (four items); co-worker support (four items); job insecurity (four items); and physical job demands (one item).

The two subscales considered [42], supervisor support (4 items) and co-worker support (4 items), had a response set of four-points in a Likert scale each and included the terms of completely disagree = 1, disagree = 2, agree = 3 and completely agree = 4.

C. STATISTICAL ANALYSIS

The initial stage consisted of data screening, which is considered the preliminary step for SEM analysis [43]. Compliance with the following assumptions was analyzed: Univariate normality was monitored using the kurtosis values for each variable, while multivariate normality considered the normalized value of Mardia's multivariate kurtosis; multicollinearity was detected through the variance inflation factor (VIF), and sample outliers were detected by means of the Mahalanobis d-squared distance, a statistical measure representing the distance of a point in relation to the centroid and expressed in standard deviation units [43].

Next, an exploratory factor analysis (EFA) was performed to determine the number of factors needed in the analysis. The maximum likelihood method was used for factor extraction, while the orthogonal Varimax method was developed for the rotation of the initial matrix, which, although it is not the simplest analytical solution, is the one that shows the clearest separation between the factors. Moreover, because it is independent from the distribution assumptions, it is less likely to produce inadequate solutions [44]. The adequacy of the sample was assessed using the Kaiser-Meyer-Olkin (KMO) tests, the Bartlett's test, and the determinant of the correlation matrix. The degree of intercorrelation among the variables was measured through the sample adequacy test (MSA). On the other hand, the reliability estimate for each construct was calculated using Cronbach's alpha coefficient [45].

The Harman's single-factor test was conducted to address the issue of common method variance [46]. Later, a confirmatory factor analysis (CFA) was performed to provide a confirmatory test of the theory represented in the measurement models, considering the model fit indices [44]. In addition, convergent validity was obtained by means of the average variance extracted (AVE) [44], calculated as the mean of the variance extracted from the standardized loadings of the items for each construct. Discriminant validity was tested using the AVE test [47].

Once the measurement models were estimated, a structural model was developed and validated to find out the influence of social support on the burnout dimensions among the chosen population. This was achieved using structural equation modeling (SEM) with the maximum likelihood estimation method (MLE). The use of SEM provided a means to evaluate each of the relationships simultaneously rather than through separate analyses, thus testing all the hypotheses posed in the research. Another advantage was that it allowed for the incorporation of the multi-item scales in the analysis [44]. A first evaluation criterion was the relative Chi-square (Chi-square / degree of freedom, CMIN / DF), calculated to judge the discrepancy of the model when the sample size is large. Additionally, the root-mean-square error of approximation (RMSEA) and goodness-of-fit index (GFI) were evaluated on the category of absolute fit indices. The Tucker-Lewis index (TLI), the Incremental Fit Index (IFI), the comparative fit index (CFI), and the normed fit index (NFI) were evaluated on the category of incremental fit indices, whereas the

parsimony ratio (PRATIO), the parsimony normed fit index (PNFI), and the adjusted goodness of fit index (AGFI) were evaluated on the category of parsimony fit indices [44]. The magnitude, direction, and statistical significance on the relationships were also evaluated, and the proposed hypotheses were validated through the analysis of the direct, indirect, and total effects among the variables. Finally, the validity of the proposed model was carried out through the expected cross-validation index (ECVI) [43].

For the statistical analysis, the IBM®SPSS®Statistics software, version 23, 64 bits edition, was used (IBM company, Chicago, IL, USA) along with the Amos™(analysis of moment structures) complementary package.

IV. RESULTS

A. SAMPLE DESCRIPTIVE ANALYSIS

The participants profile is shown in Table 1. The sample consisted of middle and senior managers, a population that is representative for the study because their profile describes the main cause of suffering burnout syndrome according to Maslach and Leiter [35], which is the frequent and demanding contact with people as a result of their multiple responsibilities.

TABLE 1. Sample's profile.

	Number of participants	Percentage of responses
Categories		
Middle management	424	91
Senior management	43	9
Gender		
Men	312	67
Women	155	33
Department		
Engineering	182	39
Administration	101	22
Production and maintenance	97	21
Materials	60	13
Safety and environment	15	3
Quality	12	2
Contract type		
Indefinite period	420	90
Temporary	40	9
Other	7	1

The valid sample consisted of 467 participants, 91% of whom worked in middle management and 9% in senior management. The engineering and administrative departments had a participation rate of over 50%, and 90% of the participants have been with the company for an indefinite period. Of those surveyed, 67% were men and 33% were women, and the average age and standard deviation (SD) of the test group were 34.36 ± 9.4 .

Table 2 shows the descriptive values for each of the items in the questionnaire administered. In the emotional exhaustion dimension, the value of the means was generally low, and the fact that most of the participants reported never feeling burned out stands out (emotional exhaustion 5). The mean values for the 6 professional efficacy items were high and were similar to each other as most of the participants shared the same feeling of exhilaration at work

TABLE 2. Mean and standard deviation of emotional exhaustion, professional efficacy, cynicism, co-worker support and supervisor support.

Variables	Short form of items	Mean	SD	Mode	Min	Max
Emotional exhaustion (0-6)†	1: Feel emotionally drained	2.30	1.33	2	0	6
	2: Feel used up	2.28	1.48	2	0	6
	3: Feel fatigued	2.13	1.52	2	0	6
	4: Feel that working is a strain	1.67	1.33	2	0	6
	5: Feel burned out	1.28	1.34	0	0	6
Professional efficacy (0-6)†	1: Deal effectively with problems	4.80	1.13	5	0	6
	2: Make effective contributions at work	4.61	1.24	5	0	6
	3: Am good at work	4.83	1.04	5	0	6
	4: Feel exhilarated at work	4.92	1.17	6	0	6
	5: Accomplish worthwhile things	4.72	1.12	5	1	6
	6: Are effective	4.89	1.14	5	0	6
Cynicism (0-6)†	1: Lack of interest	0.97	1.21	0	0	6
	2: Have lost enthusiasm	1.05	1.20	0	0	6
	3: Don't want to be bothered	2.21	1.87	1	0	6
	4: Don't really care what happens	0.99	1.29	0	0	6
	5: Doubt the value of my work	0.76	1.18	0	0	6
Co-worker Support (0-4)†	1: Co-workers are competent	3.16	0.62	3	1	4
	2: Co-workers are interested in me	2.99	0.63	3	1	4
	3: Co-workers are friendly	3.19	0.57	3	1	4
	4: Co-workers are helpful	3.10	0.61	3	1	4
Supervisor Support (0-4)†	1: Supervisor is concerned	3.22	0.72	3	1	4
	2: Supervisor pays attention	3.24	0.66	3	1	4
	3: Supervisor is helpful	3.21	0.68	3	1	4
	4: Supervisor is a good organizer	3.03	0.77	3	1	4

†Range of Likert's scale.

Min: Minimum value in the questionnaire's response scale

Max: Maximum value in the questionnaire's response scale

(professional efficacy 4). For the 5 Cynicism items, the mean values were low and varied substantially from each other. It is worth noting that the participants who sometimes liked to work alone and not be disturbed (Cynicism 3) constituted the mean value, while the majority reported that it occurred rarely in a year. For the social support dimension, the 8 items featured moderate mean values, in reference to the range of the response scale, which were similar to each other as most of the people reported to feel some social support at their workplace in one aspect or another.

B. DATA SCREENING

As a result of data screening, 108 outliers were removed; therefore, the study is considered to have a conservative level of statistical significance, with a p-value of <0.001. Furthermore, the sample did not feature any lost values. The univariate normality was evaluated considering the kurtosis absolute values. In the data, item 5 of Cynicism was identified as having a value higher than 2.859 in relation to the other variables; however, it was still below the value of 3, which is the maximum allowed [48]. The leptokurtic frequency distributions showed values ranging from 0.007 to 2.859, while for the platykurtic frequency distributions, the values ranged from -0.751 to -0.100. According to these results, no cases of extreme kurtosis were found [43]. To assess multivariate normality, Mardia's coefficient was used [49]. Since its calculated value was 624, which is greater than the obtained value of 84.608, it is possible to assume that the data set complies with the assumption. The VIF values for each variable ranged from 1.270 to 5.572. With values lower than 10 [43], it was established that there are no multicollinearity problems in the data.

C. FACTOR ANALYSIS

The exploratory factor analysis (EFA) yielded the following results: the determinant = 3.190E-7 of the correlation matrix was different from zero, indicating that the variables were correlated, so the analysis was feasible [47]. The null hypothesis was tested through Bartlett's test of sphericity, which showed that the variables in the population correlation matrix were uncorrelated [50]; the null hypothesis was rejected, with a statistically significant p-value = 0.000 and an approximate χ^2 of 6838.380, with 276 degrees of freedom. Using the Kaiser-Mayer-Olkin (KMO) test and obtaining a value of 0.903, it was also demonstrated that there is an adequate relationship between the variables [43]. The range of values for the measure of sampling adequacy for the variables fell between 0.845 and 0.953, thus exceeding the minimum allowed threshold of 0.5 [44]; this measure quantifies the degree of intercorrelations between variables and the appropriateness of factor analysis [44]. During the extraction procedure, the following eigenvalues were shown for 5 factors: 34.581 for professional efficacy, 13.042 for emotional exhaustion, 10.782 for cynicism, 5.840 for supervisor support, and finally, 4.032 for co-worker support, which yielded a total explained variance of 68.278%. The results of this stage verified and successfully surpassed the types of analyses of the relevance and validity of the data matrix.

Cronbach's Alpha index was used to measure the internal consistency of the instrument. The index ranges from 0 to 1; the closer the index is to 1, the greater the internal consistency of the items analyzed. The generally agreed upon lower limit for Cronbach's alpha is 0.70 [44]. Table 3 shows the Cronbach's alpha values and corrected total-item correlation coefficients for each construct, which are above the recommended threshold of 0.7.

TABLE 3. Reliability test results.

	Items	Mean	Standard deviation	Cronbach's Alpha	Cronbach's Alpha standardized elements	Range of corrected item-total correlation
Emotional exhaustion	5	1.936	0.454	0.894	0.894	0.697-0.783
Professional efficacy	6	4.796	0.100	0.862	0.864	0.567-0.733
Cynicism	5	1.176	0.586	0.813	0.849	0.341-0.742
Co-worker support	4	3.113	0.094	0.807	0.808	0.566-0.688
Supervisor support	4	3.177	0.100	0.897	0.899	0.725-0.805
Social support	8	3.145	0.094	0.896	0.896	0.561-0.755

Harman's single factor test [46] was performed for the group of variables. The results indicated that no single factor accounted for most of the covariance between the variables, as the independent and dependent variables were loaded onto different factors. The first factor accounted for 34.14% of the variance, a result below 50%, suggesting that the common method variance did not affect the data.

After that, a confirmatory factor analysis (CFA) was conducted. The first measurement model evaluated was a

4-factor correlated structure that included social support, emotional exhaustion, cynicism, and professional efficacy; the goodness-of-fit indices were a Chi-square value = 541.271 with 238 degrees of freedom, which was significant ($p = 0.000$), a root mean square error of approximation (RMSEA) = 0.052, a Normed Fit Index (NFI) = 0.922, a Tucker-Lewis index (TLI) = 0.947, a Comparative Fit Index (CFI) = 0.955, a Parsimony Ratio (PRATIO) = 0.862, and a Parsimony Normed Fit Index (PNFI) = 0.795.

The second measurement model evaluated was a 5-factor correlated structure including co-worker support, supervisor support, emotional exhaustion, cynicism, and professional efficacy. The goodness-of-fit indices were a Chi-square value = 529.074 with 236 degrees of freedom, which was significant ($p = 0.000$), a root mean square error of approximation (RMSEA) = 0.051, a Normed Fit Index (NFI) = 0.925, a Tucker-Lewis index (TLI) = 0.950, a Comparative Fit Index (CFI) = 0.957, a Parsimony Ratio (PRATIO) = 0.855, and a Parsimony Normed Fit Index (PNFI) = 0.791. The results shown for the goodness-of-fit indices suggest that both models adequately represent the constructs, as they are at the accepted levels [43].

As can be seen in Table 4, each of the constructs featured adequate convergence since their AVE values were greater than 0.5 [44], while the results of the AVE test indicate that the AVE values found on the diagonal were greater than the squared estimated correlations. This constitutes evidence that each construct is unique and analyzes the phenomenon, thus supporting discriminant validity.

TABLE 4. Correlations and AVE values.

Symbol	Emotional exhaustion	Professional efficacy	Cynicism	Co-worker Support	Supervisor Support
Emotional exhaustion	0.609 ^a	0.065	0.480	0.222	0.194
Professional efficacy	-0.256	0.515 ^a	0.121	0.091	0.078
Cynicism	0.693	-0.347	0.566 ^a	0.215	0.268
Co-worker Support	-0.472	0.303	-0.464	0.506 ^a	0.646
Supervisor Support	-0.441	0.280	-0.518	0.804	0.675 ^a

^aAVE values

Note: Values below the diagonal show the correlations between constructs. Values above the diagonal show the correlations between constructs squared.

D. STRUCTURAL EQUATIONS MODEL

The hypothetical relationships expressed in latent variables were tested using the two-step approach [44]. First, the fit and construct validity were tested; the results of testing the structural theory on the obtained sample will be shown later in this section.

Fig. 1 shows the results of the model used for the relationship between social support and burnout through its 3 dimensions.

In the initial model, the relationship between emotional exhaustion and professional efficacy was shown to be non-significant ($\beta = 0, p > 0.05$). Hence, the path from emotional exhaustion to professional efficacy was eliminated.

In this first model (Fig. 1), all the proposed hypotheses are shown to be statistically significant at a 95% confidence level. Likewise, it is possible to observe three negative direct effects. First is the effect of the social support variable on emotional exhaustion (H1), secondly its effect on cynicism (H2), and thirdly the effect of cynicism on professional efficacy, a relationship found in the model. The social support variable showed a moderately positive relationship with the dimension of professional efficacy (H3). In burnout dimensions, on the other hand, a strong positive relationship was found between emotional exhaustion and cynicism.

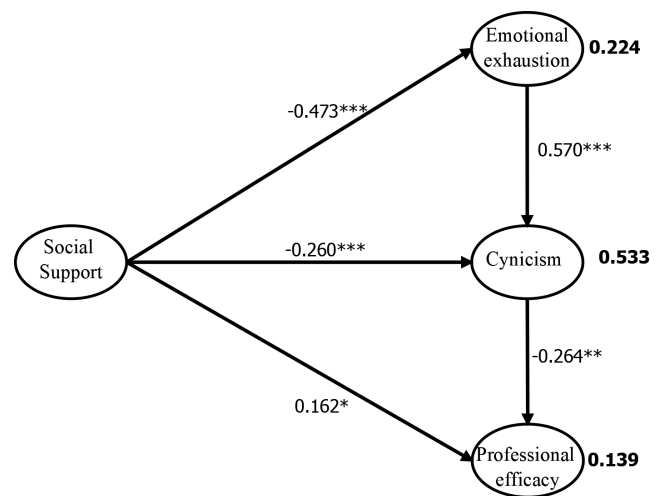


FIGURE 1. Model 1 proposed. Numbers represent the standardized regression coefficients. Numbers in bold are explained variability. Note: Statistical significance at $p < 0.050$, $p < 0.010$ and $p < 0.001$.

Table 5 shows the fit indices for Model 1. Additionally, the explained common variance proportions for the specific variables were calculated. The following values were obtained: 22.4% for emotional exhaustion, 53.3% for cynicism, and 13.9% for professional efficacy.

Fig. 2 shows the results of the model for the relationship among co-worker support, supervisor support, and burnout through its 3 dimensions. Each path indicates the association between the different constructs established in the hypotheses, as well as the standardized estimates with their respective levels of significance.

Model 2 shows the following three negative direct effects: the effect of the co-worker support variable on emotional exhaustion (H4), and the effect of supervisor support on both, emotional exhaustion (H7) and on cynicism (H9). The burnout dimensions maintained the relationships found in the proposed Model 1. Table 5 shows a comparison of the fit indices for the 2 proposed models.

Additionally, the proportions of explained common variance by the specific variables were calculated. They showed slight variations with respect to Model 1, with 23.3% for emotional exhaustion, 53.8% for cynicism, and 14.6% for professional efficacy.

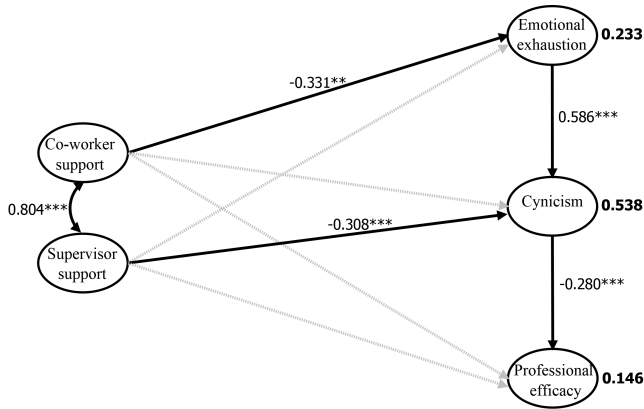


FIGURE 2. Model 2 proposed. Numbers are the standardized regression coefficients. Numbers in bold are explained variability. Dashed lines indicate non-significant loadings while solid lines indicate statistical significance at $p < 0.050$, $p < 0.010$ and $p < 0.001$.

TABLE 5. Summary of the adjustment indices to the two Structural equation models.

Measure	Acceptable level	Model 1	Model 2
MODEL FIT			
Chi-square (χ^2)		$\chi^2 = 578.169$	$\chi^2 = 487.563$
Degrees of freedom (df)		df = 241	df = 237
		p=0.000	p=0.000
χ^2/df	Less than < 3	CMIN/df = 2.399	CMIN/df = 2.057
ABSOLUTE FIT INDICES			
Root Mean Square Error of Approximation (RMSEA)	Less than ≤ 0.08	0.055	0.048
Goodness of fit index (GFI)	Close or > 0.90	0.907	0.921
INCREMENTAL FIT INDICES			
Normed Fit Index (NFI)	Close or > 0.90	0.917	0.930
Tucker-Lewis Index (TLI)	Close or > 0.90	0.942	0.956
Relative Fit Index (RFI)	Close or > 0.90	0.905	0.919
Incremental Fit Index (IFI)	Greater than > 0.95	0.950	0.963
Comparative Fit Index (CFI)	Greater than > 0.95	0.950	0.963
PARSIMONY FIT INDICES			
Parsimony Ratio (PRATIO)	Of 0.5 to 1	0.873	0.859
Parsimony Normed Fit Index (PNFI)	Of 0.5 to 1	0.801	0.799
Adjusted Goodness-of-Fit Index (AGFI)	Of 0.5 to 1	0.884	0.900

Since the Chi-square test is sensitive to sample size, 10 fit indices of the three classifications were used to analyze the models [44]. The indices show an adequate fit for the 2 proposed models; however, an improvement is observed in the indices in Model 2 as compared to those in Model 1.

Figures 1 and 2 show the direct relationships among the variables that were significant for the sample of middle and senior managers; however, indirect effects were

also found. The direct, indirect, and total effects found in the proposed models are described below. They are shown in Tables 6 and 7, respectively.

TABLE 6. Effects decomposition for the proposed model 1.

	Social Support		Emotional exhaustion		Cynicism	
	Unst.	St.	Unst.	St.	Unst.	St.
Emotional exhaustion						
Direct effects	-0.890***	-0.473***	--	--	--	--
Indirect effects	--	--	--	--	--	--
Total effects	-0.890***	-0.473***	--	--	--	--
Professional efficacy						
Direct effects	0.181*	0.162*	0.002	0.004	-0.156**	-0.264**
Indirect effects	0.154***	0.138***	-0.089*	-0.150*	--	--
Total effects	0.335***	0.300***	-0.087*	-0.146*	-0.156**	-0.264**
Cynicism						
Direct effects	-0.492***	-0.260***	0.573***	0.570***	--	--
Indirect effects	-0.510***	-0.270***	--	--	--	--
Total effects	-1.002***	-0.530***	0.573***	0.570***	--	--

Note. Unst., unstandardized; St., Standardized. With statistical significance at * $p < 0.05$, ** $p < 0.01$ and *** $p < 0.001$

TABLE 7. Effects decomposition for the proposed model 2.

	Co-worker Support		Supervisor Support		Emotional exhaustion		Cynicism	
	Unst.	St.	Unst.	St.	Unst.	St.	Unst.	St.
Emotional exhaustion								
Direct effects	-0.827**	-0.331**	-0.354	-0.176	--	--	--	--
Indirect effects	--	--	--	--	--	--	--	--
Total effects	-0.827**	-0.331**	-0.354	-0.176	--	--	--	--
Professional efficacy								
Direct effects	0.284	0.191	-0.009	-0.007	0.015	0.025	-0.165**	-0.280**
Indirect effects	0.043	0.029	0.132**	0.110**	-0.097**	-0.164**	--	--
Total effects	0.327	0.220	0.123	0.103	-0.082*	-0.139*	-0.165**	-0.280**
Cynicism								
Direct effects	0.150	0.060	-0.623***	-0.308***	0.589***	0.586***	--	--
Indirect effects	-0.488**	-0.194**	-0.208	-0.103	--	--	--	--
Total effects	-0.337	-0.134	0.832	-0.411	0.589***	0.586***	--	--

Note. Unst., unstandardized; St., Standardized. With statistical significance at * $p < 0.05$, ** $p < 0.01$ and *** $p < 0.0$

The latent variable of social support had indirect effects on professional efficiency and cynicism; on the other hand, the dimension of emotional exhaustion had an indirect effect on professional efficiency.

Finally, the validation of the model was carried out through the expected cross-validation index (ECVI) [43]. For this research study, 2 samples of 233 data each were selected and identified as sample A and sample B. The results with the values of the cross-validation indices for each of the samples were as follows: ECVA = 2.551, with a confidence interval of 90%, 2.320 to 2.816; and ECVB = 2.609, with a confidence interval of 90%, 2.372 to 2.879. As can be seen, the ECVA and ECVB values are consistent for the two samples, as well as for the confidence intervals; therefore, it is possible to assume that the proposed model is valid.

V. DISCUSSION

This research work proposes two models as applied to the population of middle and senior managers from the industrial

sector in Baja California, Mexico. Both the data-collection instruments and the proposed models show validity for the industrial sector. On the one hand, these models allow us to explain the relationship of social support with the three dimensions of burnout (Model 1). On the other hand, they show the specific relationships between the co-worker and supervisor support and the three dimensions of burnout (Model 2) to define specifically the type of support influencing each of the burnout dimensions.

The SEM methodology used in this research has been widely used in studies that relate social support to emotional exhaustion [20] and burnout [17], co-worker and supervisor support to job stress and presenteeism [29], and supervisor support to emotional exhaustion [10], to mention a few. Unlike previous studies, this research draws a comparison between two models to specifically analyze the relationships in the middle and senior management populations.

The results in Model 1 show that social support has a direct negative relationship with emotional exhaustion and cynicism, as well as a direct positive relationship with professional efficacy; this validates hypotheses 1, 2, and 3 respectively. Thus, if the worker perceives he is receiving social support, feelings of emotional exhaustion and attitudes of cynicism will decrease, and the feeling of professional efficacy will increase.

The results are consistent with previous investigations among workers [9], [17], as was expected with this first model, considering that social support should focus on helping employees reach their goals successfully [7] and solving problems in the workplace [6]. In a population of teachers, it was found that the more social support (both inside and outside the school environment) they perceived, the less they experienced burnout; however, it is not shown whether it impacts on the 3 dimensions of burnout syndrome [15].

The results also show that in the industrial sector, social support is mainly related to 2 dimensions of burnout: emotional exhaustion and cynicism, whereas its relation to the dimension of professional efficacy is weak. This may be due to the fact that the feeling of professional efficacy is more personal and is not greatly influenced by the relationship with other people, but rather, by how employees feel when performing their functions in the organization; indeed, it is regarded as more of a self-evaluation feeling.

In addition to the direct effects, it was found that social support is mediated by the feeling of emotional exhaustion, and that through this, it indirectly and negatively affects cynicism, which explains more than 50% of its variability; it also has an indirect positive effect on professional efficacy, this explaining 14% of its variability. This means that social support decreases feelings of emotional exhaustion and this, in turn, helps reduce cynical behaviors in the individual. In addition, the effect between them will increase the feeling of professional efficacy, a result consistent with that reported by [17], considering that the emotional exhaustion dimension is representative in the model and is related to the effects of the other dimensions on the

individual, which also confirms the three-dimensionality of burnout.

On the other hand, Model 2 showed better fit indices as compared to the Model 1 proposed. The model shows in greater detail the significant relationships among the population of middle and senior managers in the industrial sector as did the research by [29] since both co-worker support and supervisor support were strongly correlated.

In this research study, co-worker support showed only one negative direct relationship with the emotional exhaustion dimension, which means that if workers feel support from their colleagues, the feelings of emotional exhaustion will be mitigated. Furthermore, an indirect relationship was found which shows that this type of support also causes a reduction in employees' cynical attitudes. Finally, co-worker support did not show any relationship with the dimension of professional efficacy. On the other hand, the results showed that supervisor support has a greater influence than co-worker support on helping mitigate cynical attitudes and increase employees' feelings of professional efficacy (indirect effect). In addition, previous studies have shown that supervisor support is an important ingredient in increasing company efficiency [51]. Authentic leadership behavior and communication from supervisors will be key to driving employees' altruistic and supportive behavior towards the achievement of common and shared goals with their co-workers [5]. In this case, supervisor support does not appear to have an influence on a worker's feelings of emotional exhaustion; the reason could be that most of the time, workers interact with their colleagues, who are a representative influence in the development or mitigation of such a feeling, or that there may be a strong resistance to change in the workplace [18], [52]. However, in situations of crisis and uncertainty such as COVID – 19, the results suggest that supervisors can help employees decrease emotional exhaustion by reducing the degree of perceived uncertainties [52].

In general, Model 2 shows that high levels of support from both colleagues (indirectly) and the supervisor (directly) help mitigate the negative effects, especially of the cynicism dimension of burnout. This result is consistent with the research by [53], which also describes these levels of support as having a positive impact on satisfaction and work performance. On the other hand, for social capital theory, both co-worker support from the horizontal dimension (i.e., social contact and level of trust in the relationship with co-workers) and supervisor support from the vertical dimension (i.e., the relationship with a supervisor at different levels of the power dimensions) contribute indispensably to a work environment that is conducive to stress and tension reduction at work in a general [29].

The results show that Model 1 validates hypotheses 1, 2, and 3; however, it is worth noting that Model 2 showed each type of support as directly associated with a single dimension of burnout, which validates only hypotheses 4 and 9. Furthermore, the dimension of professional efficacy did not show a

direct relationship with any type of support; this suggests that such dimension may be strongly affected by other types of predictors such as task control or autonomy [53], complexity, and demands [22] and not necessarily by any kind of support since in Model 1 the relationship was weak, and in the second model, it did not appear in any direct relationship.

On the other hand, in the 2 proposed models, the relationships found among the 3 dimensions of burnout remained the same. These relationships have their background in the model proposed by their authors [37], for whom the feelings of emotional exhaustion lead to negative reactions towards others, as well as to cynical attitudes, which in turn, are manifestations of decreased feelings of professional efficacy; these relationships have also been confirmed among the middle and senior management sector [17], [37].

In summary, this study relates co-worker support to lower levels of emotional exhaustion; in addition, relationships between reduced work stress and presenteeism have also been found [29], [53] suggest that, in addition to this, supporting employees outside the work environment helps reduce attitudes of cynicism. On the other hand, as a finding of this research, it can be claimed that supervisor support is more significant in mitigating feelings of cynicism. In this regard, studies have found that lack of supervisor support reduces employee's commitment [54] and their desire to remain in the organization [55], causing the appearance of health problems and harming the general feelings of well-being at work [56], which in turn, leads to attitudes of cynicism in the work environment.

VI. CONCLUSION

The results of the current research have confirmed that workers' social relationships greatly influence their well-being and job performance, as previous studies have indicated; in general, such influence has been found in a wide variety of professions to a lesser or greater extent.

The main contribution of this research was to clarify the specific effects and magnitude of co-worker and supervisor support by proposing and comparing two models. The new information found in the study is of utmost importance for a the middle and senior management population, a sector featuring a growing trend yet little attention from the literature due to companies' current internal and data confidentiality policies.

This research work reached two main conclusions, which concern and should interest the government and industrial sectors if they seek to strengthen programs aimed at the workers' personal well-being. On the one hand, the results showed that having social support in companies will help to mitigate burnout among middle and senior managers in the industrial sector, thus improving employee satisfaction and productivity. It is worth mentioning that social support has the greatest influence on a worker's feelings of emotional exhaustion and, to a lesser but not less important extent, on feelings of cynicism. On the other hand, in an industrial environment, the dimension of professional efficacy is hardly

influenced by social support. The latter makes sense if it is considered that professional efficacy is a dimension of self-worth and individual work, which has little to do with the relationships that individuals develop with their co-workers.

For the second proposed model, in which social support is divided into its 2 subdimensions (co-worker support and supervisor support), and contrary to what was stated in the hypotheses, a direct impact was only found on 2 dimensions of burnout, namely emotional exhaustion and cynicism. Specifically, it was found that co-worker support only helps to mitigate the feeling of emotional exhaustion, while supervisor support plays the main role in decreasing attitudes of cynicism. This could indicate that workers feel pressured mostly by their superiors, which triggers attitudes of cynicism as a coping strategy. If, on the other hand, the supervisor provides the necessary support, feelings of cynicism in the worker will be mitigated. Furthermore, this second model confirms that in the industrial sector, workers' feeling of professional efficacy are not related to relationships with co-workers and that, although such relationships can be helpful, they are not a determining factor.

Lastly, exploring these types of support in other professions among the Mexican population could confirm this study's results and reveal whether the behavior found in the relationships is cultural or whether it belongs to a specific industrial sector.

DISCLOSURE STATEMENT

The authors declare no conflict of interest.

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SHARON MACIAS-VELASQUEZ received the bachelor's degree in industrial engineering from the University of the Istmo, Mexico, in 2012, and the M.S. degree in industrial engineering from the Technological Institute of Saltillo, Mexico, in 2015. She is currently pursuing the Ph.D. degree with the Faculty of Engineering, Architecture and Design, Autonomous University of Baja California, Mexico. Her research interests include human factors, stress in the workplace, and ergonomics.



YOLANDA BAEZ-LOPEZ received the B.S. degree in industrial engineering from the Technological Institute of Los Mochis, Mexico, in 2002, the M.S. degree in industrial engineering from the Autonomous University of Baja California (UABC), in 2008, and the Doctor of Science degree from UABC, in 2014. She is currently a Professor of industrial engineering with the Faculty of Engineering, Architecture and Design, UABC. She has been a Coordinator of the Department of Vocational and

linkage in the Ensenada campus. She has participated in several research projects related to process improvement. She is the author or the coauthor of more than 25 journal articles, book chapters, and conference papers. Her research interests include six sigma methodology, lean manufacturing, and human reliability. She is a member of the National System of Researches of the National Council of Science and Technology, Mexico.



DIEGO TLAPA received the B.S. degree in industrial engineering from the Technological Institute of Ciudad Juárez, Mexico, in 2002, the M.S. degree in industrial engineering from the Autonomous University of Baja California (UABC), Mexico, in 2007, and the Doctor of Science degree from UABC, in 2013. He is currently a Professor of industrial engineering with the School of Engineering, Architecture and Design, UABC. He has participated in several research projects

related to process improvement. He is the author or the coauthor of more than 30 journal articles, book chapters, and conference papers. His research interests include supply chain management and processes improvement projects, including six sigma and lean manufacturing. He is a member of the National System of Researches of the National Council of Science and Technology, Mexico, and the Optimization of Industrial Processes Network (ROPRIN).



JORGE LIMON-ROMERO received the B.S. degree in industrial engineering from the Technological Institute of Los Mochis, Mexico, in 2001, the M.S. degree in industrial engineering from the Technological Institute of Hermosillo, in 2004, and the Doctor of Science degree from the Autonomous University of Baja California, Mexico, in 2013. He is currently a Professor of industrial engineering with the Faculty of Engineering, Architecture and Design, Autonomous

University of Baja California. He has participated in several research projects

related to process improvement. He is the author or the coauthor of more than 30 journal articles, book chapters, and conference papers. His research interests include processes and products optimization working with methodologies, such as six sigma and lean manufacturing. He is a member of the National System of Researches of the National Council of Science and Technology, Mexico, and the Optimization of Industrial Processes Network (ROPRIN).



AIDÉ ARACELY MALDONADO-MACÍAS received the bachelor's and M.Sc. degrees in industrial engineering and the Ph.D. degree in sciences with a focus on industrial engineering from the Technological Institute of Ciudad Juárez. She is currently a full-time Professor-Investigator with the Autonomous University of Ciudad Juárez. She has published in indexed journals in English and Spanish, such as *International Journal of Industrial Engineering*, *International Journal of*

Advanced Manufacturing Technology, *Expert Systems with Applications*, *Work: A Journal of Prevention, Assessment and Rehabilitation*, *International Journal of Environmental Research and Public Health*, *IEEE ACCESS*, *Complexity*, and *Sustainability*. She has collaborated with books and book chapters for Springer Editorial. Her research interests include evaluation and ergonomic design, cognitive ergonomics anthropometric studies and work-related stress studies, multicriteria and multi-attribute decision-making with fuzzy logic and axiomatic design applications, ergonomic evaluation for the selection of technology of advanced manufacturing, and structural equation models. She received the State Science and Technology Award 2018 and the Chihuahuense Destacada distinction in the Scientific Field, Mexico. She is recognized as an Investigator SNI 2 by the National Science and Technology Institute.



DORA-LUZ FLORES is currently a full-time Professor with the Universidad Autonoma de Baja California. Her experience is using statistical methods for learning from data including, data mining in bioengineering, computational biology, and design of experiments of nanomaterials. Her research interests include machine learning and artificial intelligence. She is a member of the National System of Researches of the National Council of Science and Technology, Mexico, and

the Mexican Society of Biomedical Engineering. She received the Fulbright-García Robles Award for conducting a research stay with the University of California at Irvine.



ARTURO REALVÁSQUEZ-VARGAS received the master's degree in industrial engineering and the Ph.D. degree in engineering sciences from the Autonomous University of Ciudad Juarez, Mexico, and the Ph.D. degree in innovation from the University of La Rioja, Spain, with a focus on product engineering and industrial process. He is currently a full-time Professor with the Department of Industrial Engineering, Tecnológico Nacional de Mexico/Instituto Tecnológico de Tijuana, Mexico. He is the author or the coauthor of around 12 articles published in journals indexed in the Journal Citation Reports. He is the author of one book published by the international publisher Springer, related to ergonomics. His main research interests include optimization of industrial processes, lean manufacturing, and ergonomics. He is an Active Member of the Society of Ergonomists of Mexico Civil Association (Sociedad de Ergonomistas de México, SEMAC) and a member of the National System of Researches of the National Council of Science and Technology, Mexico. He has edited books in IGI Global and Springer, all of them related to ergonomics and industrial engineering.

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