Path Analysis Study on the Direct and Indirect Effect of Factors Affecting Performance of Pharmaceutical Staff in Primary Health Centers in Bandung

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ABSTRACT

Background: Pharmaceutical staff plays an essential role in pharmaceutical services. Despite their role, several factors have been reported to cause suboptimal provision of pharmaceutical services.

Objectives: This study aimed to examine the impact of physical environment, compensation, and motivation on organizational culture, and its implication on performance of pharmaceutical staff.

Methods: The sample population comprised 149 pharmaceutical staff from 71 Primary Health Centers in Bandung, selected using total sampling. The inclusion criteria were pharmaceutical staffs in 71 Primary Health Centers in Bandung. Pharmacy personnel who refused to give consent or did not complete filling out instruments were excluded. Data were collected using a questionnaire to assess the participants' perceptions of physical environment, compensation, motivation, organizational culture, and performance. Direct and indirect effect of each variable and its correlation was determined by path analysis. All analysis were performed by using the SPSS version 25.

Results: The physical environment, compensation, motivation, and organizational culture contributes 66.4% to overall performance of pharmaceutical staffs. Physical environment and motivation significantly influenced performance (β=0.331 and β=0.245, respectively) directly and indirectly through organizational culture. Compensation had neither direct and indirect impact on performance. Organizational culture has a direct effect on pharmaceutical performances (β=0.789). Organizational culture is an intervening variable of the physical environment and motivation impact on performance.

Conclusion: These findings suggest that the physical environment dan motivation directly influenced performance of pharmaceutical staffs, while financial compensation had no direct or indirect impact. Organizational culture significantly influences the performance by intervening the physical environment and motivation factors.

Keywords:
Compensation; Motivation; Organizational culture; Performance of pharmaceutical staff; Physical environment

INTRODUCTION

Medicine is an essential element in addressing health concerns by preventing, treating, maintaining, and alleviating symptoms. However, for medicine to be effective, it must be used rationally and tailored to the specific needs of patients, taking into account factors, such as clinical indications, dosage, duration, route, and affordability.[1] Several studies have shown that rational usage can prevent unsafe and ineffective medication practices, reduce the duration of illnesses, and reduce treatment costs.[2]

Despite its importance, the use of medicine in the community is affected by various factors, with low adherence being a significant challenge, specifically among patients managing multiple chronic conditions. A study by Foley et al. indicated that 69.4% of patients were non-adherent to their medicine.[3] Previous reports have also shown that non-adherence can lead to non-recovery, relapse, prolonged treatment duration, and increased financial burden. In addition, several factors have been reported to contribute to non-adherence, including socioeconomic factors (education level, lifestyle, income, housing size, occupation), healthcare system issues (patient-healthcare provider relationship, pharmacy services provided, communication, medicine availability), patient-related issues (behavior, forgetfulness, busyness, fear of side effects, less favorable expectations about medicine), disease conditions (severity, chronicity, disease duration, comorbidities), and therapy-related concerns (cost, lack of understanding of medicine use, complex therapy, number of medicine, duration of use, side effects).[4,5]

Another prevalent issue associated with medicine usage is unwanted side effects, which often lead to Adverse Drug Reactions (ADRs) and prompt patients to visit the emergency department (ED). In Italy, statistics showed that over a year, the visitation of 3.4% of 16,963 patients in the ED was caused by ADRs, and 15.1% required inpatient care. Several studies have shown that the increased prevalence of these reactions is caused by the intake of antibiotics and anti-inflammatory medicine.[6] In this context, clinical pharmaceutical staff play an essential role in ensuring the rational use of medicine through a multidisciplinary approach. Furthermore, the approach typically comprises providing accurate information and guidance on ADRs, the schedules and dosages, warning about undesirable effects, and monitoring.[2] Clinical pharmaceutical staff are also instrumental in the reporting, identification, and prevention of ADRs, leading to prompt management and the reduction of morbidity and mortality rates.[7] Surveys conducted among the general public indicated that 49.41% of participants always visited community pharmacies, 74.21% discussed health matters with pharmaceutical staff, and 58.46% stated that the professionals spent approximately 5 to 9 minutes per customer. Furthermore, 61.81% of participants revealed that counseling services provided by pharmaceutical staff were beneficial, specifically regarding medicine and health conditions.[8]

Community pharmaceutical staff offer a wide array of services aimed at enhancing patients care, including assistance with minor ailments (self-medication), dispensing and counseling, health screening and monitoring (99.5%), selection and recommendation of health supplements (99.5%), medication reviews (68.8%), weight management (52.4%), and smoking cessation consultation (51,04%).[9] These services have been reported to have the potential to enhance the success of treatment and improve adherence. In a previous study, among 322 patients receiving insulin therapy, a pharmaceutical intervention over 12 months led to a significant increase in adherence scores from 50.8% to 80.7% based on the Morisky Test.[10] Similar results were also obtained among uncontrolled type II diabetes mellitus patients, where the provision of pharmaceutical services (assessment of pharmacological and non-pharmacological needs, counseling, and educational materials) effectively reduced average blood sugar levels, systolic blood pressure, and improved lipid profiles.[11] Another study showed the reduction of patients' blood pressure and hospital stay durations.[12]

Despite the reported benefits, the consistent provision of pharmaceutical services by pharmaceutical staff in practical settings remains challenging. Roseno & Widyastiwi carried out a study on self-medication services in 232 community pharmacies in Bandung City. According to assessments by mystery shoppers, only 42.82% of pharmaceutical staff gathered information regarding the signs and symptoms of patients' conditions, 14.44% gathered information about medicine used, and 10.56% asked about specific conditions. In addition, the selected medicine was appropriate in 85.34% of cases, and the information commonly provided by pharmaceutical staff was related to usage instructions (59.09%), with minimal discussion on side effects (5.17%).[13] In another study, 37% of participants indicated that pharmaceutical staff did not provide information on the appropriate use of medicine properly. In comparison, 70.47% complained about the absence of inquiry whether patients comprehended the instructions given.[8]

In line with previous studies, the suboptimal provision of pharmaceutical services has a significant impact on patients. Patients' awareness regarding medicine regimens is still low, with approximately 70.8% of participants knowing the indication of medicine used. Furthermore, 58.3% were aware of the therapy duration, 55.3% knew when to take medicine, and only 23% were aware of the potential side effects.[14] These findings were consistent with a previous study indicating that the knowledge, attitude, and practice related to allergic reactions to paracetamol, a widely used analgesic and antipyretic, remained low.[15]

Several factors have been reported to affect the provision of pharmaceutical services, including a lack of knowledge, reluctance to take responsibility,[16] insufficient time, inadequate staffing levels, a lack of motivation,[17] insufficient financial compensation,[18] a lack of dedicated counseling areas, limited clinical knowledge and

information,[19] and insufficient support from other professionals. Other influential factors include low patient demand, a lack of guidelines, inadequate training, poor communication skills, limited access to patient medical records, inadequate rewards, and difficulties accessing objective medical information sources.[20]

Apart from providing pharmaceutical services, pharmaceutical staff have a role in management, particularly in medicine management by ensuring the availability and quality of medicine. Therefore, this study aimed to examine the direct and indirect impact of physical environment, compensation, and motivation on organizational culture and its implication on pharmaceutical staff performance using path analysis.

METHODS
Study design
This was a quantitative study using cross-sectional design. This study was conducted from January to September 2023 in 71 Primary Health Centers in the Work Area of Bandung Health Office.

Population and samples
The population of the study comprised all pharmacy personnel working in 71 Primary Health Centers in Bandung City. Samples were selected using the total sampling method. The inclusion criteria were pharmacists, pharmaceutical technical assistants (TTK), and other designated pharmacists working in 71 Primary Health Centers in Bandung City. Pharmacy personnel who refused to give consent or did not complete filling out instruments were excluded from the study.

Study instruments
The study instrument was developed by referring to the Minister of Health Regulation No. 74 of 2016 concerning Pharmaceutical Service Standards at Primary Health Centers. Furthermore, it was a validated and reliable questionnaire to measure the independent variables X1 (Physical Work Environment), X2 (Financial Compensation), and X3 (Motivation), the intervening variable (between) Y (Organizational Culture), and the dependent variable Z (Pharmacy Personnel Performance). The questionnaire was divided into 6 sections, as follows:
1. The first section contained identity information, such as age, gender, and highest education level.
2. The second section consisted of 18 statements related to the physical environment with a Likert scale (1=strongly disagree, 5=strongly agree). Some statements included lighting, airflow, room freshness, noise, humidity, and availability of various facilities, such as compounding room, warehouse, narcotics storage, administrative room, dispensing area, service reference books, computers, medicine shelves, and LPLPO (Report of Medicine Usage and Request Sheet) forms.
3. The third section contained 16 statements related to compensation measured with a Likert scale (1=strongly disagree, 5=strongly agree). Some statements included received salary, income adequacy with workload, incentives/bonuses, holiday allowances, insurance protection, recreation, and leave.
4. The fourth section comprised 14 statements associated with work motivation with a Likert scale (1=strongly disagree, 5=strongly agree). Some statements included attention and policies from superiors, superior-subordinate relationships, recognition of achievements, training, staff communication, work situations, staff performance assessments, and other motivations, such as salary, friendships, and career development opportunities.
5. The fifth section contained 16 statements related to work culture with a Likert scale (1=strongly disagree, 5=strongly agree). Some statements included timeliness of work, responsibility for tasks, adherence to work procedures, work vision, attitude towards differences of opinion, and a desire to improve skills constantly.
6. The sixth section consisted of 25 statements on staff performance with a Likert scale (1=strongly disagree, 5=strongly agree). Some statements included patient treatment, prescription analysis, recording of outgoing and incoming products, medicine storage, provision of medicine information, creation of LPLPO and RKO (Medicine Needs Plan), reporting of the side effects, prescription archiving, stock-taking, and report evaluation.

Data collection
Data collection was carried out directly by enumerators who were trained prior study. The enumerators conducted structured interviews using questionnaires with pharmaceutical staffs at Primary Health Centers. The

data-cleaning process was carried out directly, and ordinal data were converted into interval scales using the successive interval method prior to multiple regression analysis using Path analysis.

Modelling and Data Analysis

The assessment of the impact between variables was conducted using Path Analysis. This analysis is an extension of multiple regression analysis and estimates magnitude of the direct and indirect effects of the independent variables.[21] In this study, we determine direct and indirect effects of factors affecting on pharmaceutical staff performance through the intervening variable (organizational culture). All analysis were performed by using the SPSS Statistical Package version 25.

The path analysis consisted of 3 stages as follows:

1. The first analysis conducted was descriptive (frequency distribution) for each variable: X1 (physical work environment), X2 (financial compensation), X3 (motivation), Y (organizational culture), and Z (Performance of pharmaceutical staffs).

2. In the second stage, we conducted correlation analysis between variables using Pearson correlation test if the data were normally distributed and homogeneous, Spearman correlation test if the data were not normally distributed or homogeneous.

3. In the third stage, path analysis was conducted to examine the impact of variables X1 (physical work environment), X2 (financial compensation), and X3 (motivation) on variable Y (organizational Culture) and variable Z (Performance of pharmaceutical staffs). In this study, the direct effect is interpreted as a direct effect of three independent variables observed: physical work environment (X1), financial compensation (X2), and motivation (X3) on the performance of pharmaceutical staff (Z). Meanwhile, in indirect effect, we determine whether physical work environment (X1), financial compensation (X2), and motivation (X3) were predictors of organizational culture (Y), which furthermore, affects the performance of pharmaceutical staff (Z). A variable with arrows pointing at it will be the criterion variable and each of the variables having arrows pointing to it will be the predictors[21].

4. In path analysis, subsequent successive multiple regression studies examined both direct and indirect effects, estimating the standardized coefficients β for each variable. Standardized coefficients β quantified the strength of a path, conceptually equivalent to the standardized partial regression coefficients. The coefficient (β) ranged from -1 to +1. A larger value of coefficient indicates a more substantial impact of one variable on another. The significance of a path in a path analysis model was assessed using the t-value, which is the ratio of the unstandardized estimate to standard error. A path was considered significant at the 0.05 level if the t-value was more than 1.96[22].

5. Furthermore, according to Tarling[23], (a) direct effect was symbolized using coefficient (β), (b) indirect effect was determined by multiplying the route coefficients (β) linking the independent variable to the dependent variables through intervening variables (X1, X2, X3 to Z; through Y), and (c) total effects (as the aggregate of direct and indirect effects)[24]. Odds ratio (OR) for total effects were obtained by exponentiation of the regression parameters (odds ratio (OR = e^{β})[25].

RESULTS AND DISCUSSION

Among 160 questionnaires distributed to participants, 154 were filled out, and 149 met the criteria for further analysis. The data collection process is illustrated in Figure 1.

Among the 149 participants who completed the questionnaire, 127 (85.2%) were female, 112 (75.2%) were aged 26-35 years old, 81 (54.4%) were pharmacists, 119 (79.9%) had worked for 0-10 years, and 62 (41.6%) were civil servants, as shown in Table I.

Table II showed that the average score of participants' perception regarding work/organizational culture was 4.30 ± 0.41 and regarding performance at 4.41 ± 0.45 (minimum score is one and maximum score is five). Meanwhile, regarding factors influencing work/organizational culture and performance, participants' perception was lower (physical environment 3.99 ± 0.61; financial compensation 3.61 ± 0.64; and motivation 3.95 ± 0.49). Among five analyzed factors, financial compensation was found to be the most unfavorable factor perceived by participant, and work/organizational culture was the most favorable one.

This study result indicating that: (1) There were no differences in work/organizational culture and performance of pharmaceutical staffs based on gender, educational level, and employment status; (2) Organizational culture and performance scores increased with age and length of work; (3) Regarding the environment factor, older group perceived physical environment better compared younger group of age; (4) The
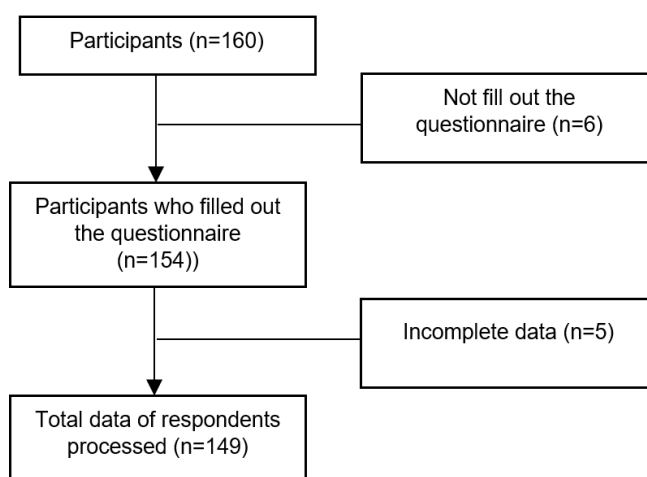
Figure 1. Flowchart of respondent data collection in the study

Table I. Description of Particpants' characteristics in the Study (n=149)

Characteristics	Total (n)	Percentage (%)
Gender		
Male	22	14.8
Female	127	85.2
Age (Years)		
26-35	112	75.2
36-45	18	12.1
46-55	14	9.4
56-65	5	3.3
Education		
Pharmacy associate degree (D3)	35	23.5
Pharmacy bachelor's degree (S1)	33	22.1
Pharmacist	81	54.4
Length of Work (Years)		
0-10	119	79,9
11-20	14	9,4
21-30	10	6,7
31-40	6	4,0
Employment Status		
BLUD[a]	39	26.2
PPPK[b]	48	32.2
Civil Servants	62	41.6
TOTAL	**149**	**100.0**

[a]Regional General Services Agency; [b] Government Employees with Employment Agreements

compensation received by staff increased along with their employment status and age; (5) Staff motivation was highest within the age group of 46-55 years, with civil servant status, and having certificate of pharmacist education. This discovery aligns with earlier studies concluded that demographic characteristics to be a factor that influences organizational work culture. Age is crucial in shaping individuals' knowledge, work experience, abilities, viewpoints, and communication in the work environment.[26] Individuals' sense of responsibility grew as they aged. The results aligned with research indicating that persons between 40-50 years old exhibited more significant organizational commitment than younger individuals, whereas staff members aged 30-35 showed a more robust competitive culture compared to younger age categories.[27]

Table III showed a detailed participants' perceptions of various variables studied, including physical environment, motivation, financial compensation, work culture, and pharmaceutical personnel performance.

Table II. Description of Participants' Perceptions regarding physical environment, compensation, motivation, work culture, and performance at Primary Health Centers in Bandung

Characteristics	Physical Environment*	Compensation*	Motivation*	Work Culture*	Performance*
Gender					
Male	4.05 ± 0.56	3.60 ± 0.74	3.92 ± 0.67	4.32 ± 0.47	4.45 ± 0.45
Female	3.98 ± 0.62	3.61 ± 0.62	3.95 ± 0.46	4.29 ± 0.40	4.40 ± 0.45
Age (Years)					
26-35	3.93 ± 0.60	3.55 ± 0.67	3.90 ± 0.51	4.26 ± 0.41	4.35 ± 0.44
36-45	4.06 ± 0.57	3.72 ± 0.53	4.06 ± 0.42	4.45 ± 0.40	4.59 ± 0.43
46-55	4.20 ± 0.64	3.83 ± 0.48	4.18 ± 0.44	4.38 ± 0.36	4.54 ± 0.44
56-65	4.37 ± 0.67	4.01 ± 0.58	3.97 ± 0.11	4.48 ± 0.47	4.66 ± 0.48
Education					
Pharmacy associate degree (D3)	4.05 ± 0.60	3.82 ± 0.51	4.01 ±0.44	4.29 ± 0.37	4.38 ± 0.44
Pharmacy bachelor's degree (S1)	3.93 ± 0.65	3.32 ± 0.78	3.95 ± 0.53	4.30 ± 0.44	4.42 ± 0.47
Pharmacist	3.98 ± 0.60	3.64 ± 0.59	3.92 ± 0.50	4.30 ± 0.42	4.42 ± 0.45
Length of Work (Years)					
0-10	3.95 ± 0.61	3.53 ± 0.65	3.91 ± 0.51	4.28 ± 0.42	4.38 ± 0.45
11-20	3.96 ± 0.65	3.9 ± 0.58	4.12 ± 0.48	4.35 ± 0.39	4.37 ± 0.45
21-30	4.55 ± 0.38	4.08 ± 0.47	4.17 ± 0.28	4.44 ± 0.40	4.64 ± 0.39
31-40	3.83 ± 0.37	3.69 ± 0.46	3.91 ± 0.42	4.34 ± 0.32	4.65 ± 0.49
Employment Status					
BLUD[a]	3.93 ± 0.63	3.28 ± 0.86	3.88 ± 0.51	4.30 ± 0.45	4.41 ± 0.47
PPPK[b]	4.02 ± 0.57	3.57 ± 0.49	3.95 ± 0.59	4.32 ± 0.42	4.37 ± 0.46
Civil Servant	4.00 ± 0.63	3.86 ± 0.46	3.99 ± 0.40	4.28 ± 0.39	4.45 ± 0.43
Average	**3.99 ± 0.61**	**3.61 ± 0.64**	**3.95 ± 0.49**	**4.30 ± 0.41**	**4.41 ± 0.45**

*Minimum score 1, Maximum 5. Data presented as Mean ± SD; [a]Regional General Services Agency; [b] Government Employees with Employment Agreements

Table III. Description of Participants' Perceptions of Physical Environment, Compensation, Motivation, Work Culture, and Performance at Primary Health Centers in Bandung

	ANALYZED FACTORS	AVERAGE SCORE [a]
	ENVIRONMENT	
1	The lighting in the pharmaceutical service room meets the needs	4.34 ± 0.73
2	**The lighting in the pharmaceutical service room is very good**	**4.36 ± 0.69**
3	The incoming and outgoing airflow is always clean and well-maintained	3.99 ± 0.93
4	The freshness of the room is always maintained, making it comfortable in the medicine service area	3.99 ± 0.89
5	External noise does not disturb	3.40 ± 1.17
6	The chosen colors are suitable for pharmaceutical services	4.23 ± 0.62
7	Room temperature and humidity are quite good	3.99 ± 1.02
8	There is a room for compounding/preparing medicine	3.96 ± 1.08
9	The medicine storage warehouse has adequate capacity	3.17 ± 1.43
10	Storage space for narcotics, vaccines, and thermolabile medicine is appropriate.	4.30 ± 0.91
11	The administrative room is spacious enough	3.51 ± 1.20
12	There is a special room for medicine consultation	3.01 ± 1.47
13	There is a dedicated room for dispensing medication	3.99 ± 1.00
14	Reference books are available in hardcopy/softcopy format	4.28 ± 0.65
15	**Computers are available to assist in management/service processes**	**4.42 ± 0.75**
16	There are shelves for medicine with appropriate quantity and size	4.09 ± 0.94
17	**There are enough report forms and stock cards available**	**4.59 ± 0.51**
18	There is a water dispenser for reconstituting dry syrup preparations	4.13 ± 1.16

Table III. (Continued)

ANALYZED FACTORS	AVERAGE SCORE [a]
COMPENSATION	
1 The salary received corresponds to the workload	4.01 ± 0.81
2 The received salary is sufficient to meet living expenses	3.97 ± 0.85
3 There is never a delay in salary payments	3.98 ± 0.90
4 **Receive incentives/benefits according to the tasks performed**	**4.03 ± 0.83**
5 **The received incentives/benefits are by the regulations**	**4.08 ± 0.75**
6 I always receive bonuses for achieving my targets	2.92 ± 1.32
7 Commission/bonuses received are by agreements with business partners.	2.97 ± 1.35
8 **Always receive holiday bonuses**	**4.05 ± 1.03**
9 Receive retirement funds when reaching the designated age	2.98 ± 1.68
10 Protected by insurance provided by the workplace	3.95 ± 1.14
11 Received insurance covers health expenses adequately	3.99 ± 0.89
12 Provided with recreation opportunities every year-end	3.27 ± 1.30
13 The recreation provided meets expectations and desires	3.13 ± 1.24
14 Given recreation when achieving targets set by the institution	2.66 ± 1.41
15 Given sufficient vacation days	3.76 ± 0.84
16 Able to easily arrange vacation time once work is completed	4.03 ± 0.74
MOTIVATION	
1 Superiors always pay attention to staffs	4.01 ± 0.70
2 In solving problems, superiors act wisely	3.96 ± 0.77
3 Good and flexible working relationship between superiors and subordinates	4.01 ± 0.77
4 Superiors provide training to staffs to improve their abilities and skills	3.93 ± 0.79
5 Superiors always communicate with subordinates about everything related to task achievement efforts	4.07 ± 0.66
6 Superiors always praise staffs who perform their duties satisfactorily	3.89 ± 0.79
7 The working environment is good and pleasant	4.10 ± 0.70
8 Working here helps staffs develop their abilities	3.81 ± 0.88
9 Staff achievements are always carefully and accurately evaluated	3.74 ± 0.93
10 Opportunities and chances to develop skills and abilities	3.86 ± 0.85
11 **Striving very hard to improve past performance**	**4.19 ± 0.53**
12 **Experiencing satisfaction when completing difficult tasks**	**4.26 ± 0.52**
13 The salary received encourages better work	3.99 ± 0.71
14 **The attitude of colleagues can motivate work**	**4.23 ± 0.59**
WORK/ORGANIZATIONAL CULTURE	
1 Completing tasks on time	4.33 ± 0.56
2 Performing tasks with high responsibility	4.42 ± 0.51
3 Being careful in performing tasks	4.42 ± 0.54
4 **Following procedures and rules in performing tasks**	**4.43 ± 0.52**
5 Communicating effectively at work	4.42 ± 0.51
6 Feeling comfortable with the current workplace	4.15 ± 0.72
7 Expressing ideas for the advancement of my institution	4.15 ± 0.64
8 Preparing oneself as best as possible before working	4.30 ± 0.52
9 Being able to perform my tasks independently	4.21 ± 0.64
10 Striving for innovation in completing tasks	4.19 ± 0.62
11 **Respecting differences of opinion with coworkers**	**4.42 ± 0.51**
12 **Treating patients and colleagues very well**	**4.46 ± 0.50**
13 Having a clear vision in the work	4.30 ± 0.51
14 Enjoying challenges in performing tasks	4.05 ± 0.70
15 Striving to improve my abilities in carrying out my work	4.32 ± 0.49
16 Assessing the quality of work that has been performed	4.22 ± 0.51

Table III. (Continued)

ANALYZED FACTORS	AVERAGE SCORE [a]
PERFORMANCE	
1 Preparing the service room before work	4.40 ± 0.53
2 Recording incoming and outgoing items on the stock card for every movement of medicines	4.42 ± 0.73
3 Creating reports and planning reports on time	4.29 ± 0.77
4 Checking the suitability of ordered medicines with those provided by the Department	4.46 ± 0.59
5 Storing codeine medicines in the narcotics cabinet	4.38 ± 0.93
6 Storing medicines based on their dosage forms	4.54 ± 0.51
7 Storing medicines based on FIFO (First In, First Out) and FEFO (First Expired, First Out) methods	4.54 ± 0.50
8 Checking storage conditions, including temperature and humidity	4.40 ± 0.62
9 **Conducting periodic stock opname activities**	**4.57 ± 0.50**
10 Prescription screening (administrative, pharmaceutical, and clinical)	4.50 ± 0.53
11 Clinically reviewing prescriptions to avoid medicine interactions	4.47 ± 0.53
12 **Confirming the patient's name when dispensing medication**	**4.60 ± 0.49**
13 Treating patients with utmost politeness and empathy	4.56 ± 0.50
14 Archiving served prescriptions	4.56 ± 0.50
15 **Providing information about medicines indications and usage**	**4.60 ± 0.49**
16 Providing information about possible side effects of medicines	4.46 ± 0.54
17 Providing information on how to store medicines at home	4.36 ± 0.59
18 Documenting drug information (patient information leaflet) activities and counseling for patients and other healthcare professionals	4.29 ± 0.64
19 Creating reports on medication administration errors	4.17 ± 0.64
20 Evaluating reports on medication administration errors	4.20 ± 0.69
21 Generating rational medicines use reports on time	4.38 ± 0.64
22 Creating reports on medicines side effects that occur during medicines use	4.21 ± 0.65
23 Making daily reports when pharmaceutical services are completed	4.43 ± 0.57
24 Calculating remaining medicines stock in the pharmacy warehouse after service completion	4.05 ± 0.99
25 Creating reports on damaged, expired, or lost medicines	4.42 ± 0.62

[a] minimum score 0, maximum score 5. Data presented as Mean ± SD. Top three highest score is presented in bold

The study results indicate the following: (1) Participants felt that the physical environment was adequate, with sufficient report forms available, good lighting, no noise disruptions, and storage in accordance with regulations. However, more space is needed, especially for consultations; (2) Participants were satisfied with their financial compensation, receiving incentives according to their workload and the provisions. On the other hand, they also expected appreciation for meeting targets; (3) Pharmaceutical staffs were motivated by their colleagues and their success in completing tasks, but also felt the need for evaluation, feedback, and opportunities for development; (4) The organizational culture promoted treating patients and colleagues with respect, valuing diverse opinions, and following standard operating procedures. However, there was a need to develop a work culture that could enjoy challenges and express new ideas to advance the institution; (5) Participants self-assessed their performance and found that they provided adequate drug information and stock-taking services. However, activities related to identifying and reporting medication errors could be enhanced.

Performance of pharmaceutical staff was generally measured in 2 main areas: drug management and clinical pharmaceutical services. The activities commonly carried out included dispensing, compounding, consultation, clinical risk management, medicine usage monitoring, over-the-counter medicine support, services, logistics/storage, rational medicine usage, and self-development.[28] The results of this study suggested that the participants were fulfilling their duties effectively in both management and clinical pharmacy. In both aspects of performance, employees, as an individual, were the most dominant factors in organization. The human factor, as a source of competitive advantage, is an integral part of a company's core elements. Organizational goals can

be achieved by the collective efforts of pharmaceutical staff who demonstrate strong individual performance, leading to positive organizational performance.[29,30]

This study also highlights the importance of self-development for pharmaceutical professionals to enhance their abilities and expertise. It is important for management to encourage employees to develop their skills and knowledge to keep up with the fast-paced advancements in pharmaceutical research. This is especially important given the global problems arising from new technologies, services, and therapies in the field. A study by Mamiya et al. highlights that pharmacists recognize the need for self-improvement and are inclined towards self-directed learning.[31] Continuous Professional Development (CPD) is essential for healthcare professionals, including pharmacists, to stay current and informed about the rapid influx of new information, particularly concerning to artificial intelligence and technology.[31]

Table IV showed regression analysis models I and II, which examined the impact of independent variables (physical environment, motivation, and compensation) on intervening variables (organizational culture), and dependent variables (pharmaceutical personnel performance) in Primary Health Centers in Bandung.

Table IV showed the regression analysis which examined the relationship between independent variables, intervening variable, and dependent variable. The regression analysis model I results indicated that physical environment (t>1.96), motivation (t>1.96), and compensation (t<1.96) together had an impact of 47.3% on organizational culture in Primary Health Centers. Furthermore, in regression analysis model II showed that physical environment (t>1.96), compensation (t<1.96), motivation (t>1.96), and work culture (t>1.96) contributed 66.4% influence on the performance of pharmaceutical staff, the remaining 33.6% influence could be attributed to other variables outside this study. In Model I and II regression analysis, compensation did not significantly impact (t<1.96) organizational culture and performance of pharmaceutical staffs at Primary Health Centers in Bandung. In this study, we found that physical environment, along with motivation, and compensation contributed 47.3% in shaping work culture. Furthermore, together with work culture factor counted, these factors had a 66.4% influence on the performance of pharmaceutical staff. Interestingly, while the physical environment and motivation had a substantial impact according to statistics, compensation factors did not. Several possible explanations for these results were discussed in the subsequent section.

The path analysis model (Figure 2) presents the factors influencing the performance (Z) of pharmaceutical staff in Primary Health Centers are categorized as follows: (1) direct impact from the physical environment (X1); (2) direct impact from financial compensation (X2); (3) direct impact from motivation (X3); (4) indirect impact from the physical environment (X1), mediated by organizational culture (Y); (5) indirect impact from compensation (X2), mediated by organizational culture (Y); (6) indirect impact from motivation (X3), mediated by organizational culture (Y). Table 5 presents the path coefficient decomposition of the relationships between independent, intervening, and dependent variables.

Path analysis model and its coefficient decomposition indicates that: (1) physical environment dan motivation towards performance are variables with a significant direct effect (t-value>1.96); (2) Organizational culture had a significant indirect effect of physical environment and motivation, therefore physical environment and motivation has an indirect effect on performance (t-value<1.96). Organizational culture also has a direct effect on pharmaceutical performances (t-value>1.96). (3) Organizational culture significantly influences the performance of pharmaceutical staff by intervening in the physical environment and motivation factors. (4) Financial compensation has neither direct and indirect towards performance (t-value<1.96).

Statistic description (shown in table V) along with graphical model shown in figure 2, provides information that the factor that has the most significant direct effect on performance of pharmaceutical staffs is organizational culture (β=0.789), followed by physical environment (β=0.166), and motivation (β=0.174). Physical environment and motivation also have an indirect effect on performance mediated by organizational culture. The direct effect of the physical environment on performance has a positive coefficient of 0.166 (odds ratio (OR) = $e^{0.166}$ = 1.180), and the indirect effect through organizational culture has a positive coefficient of 0.331 (odds ratio (OR) = $e^{0.331}$ = 1.392). This result implied that a positive physical environment could enhance employee performance by 1.18 times, moreover, organizational culture (as an intervening factor) significantly increases the odds ratio to 1.39 times compared to its direct effect. Based on this result, it can be concluded that pharmaceutical staff worked in a positive physical environment might create a positive organizational culture and enhance employee performance by 1.39 times.

Similar findings were obtained by Angrayni stated that a poor physical environment was identified as a factor contributing to medication errors[32], with several reports showing that its adjustment could enhance safe medicine usage. Furthermore, fluorescent white light, with a strength of 50 watts, was recommended for use in
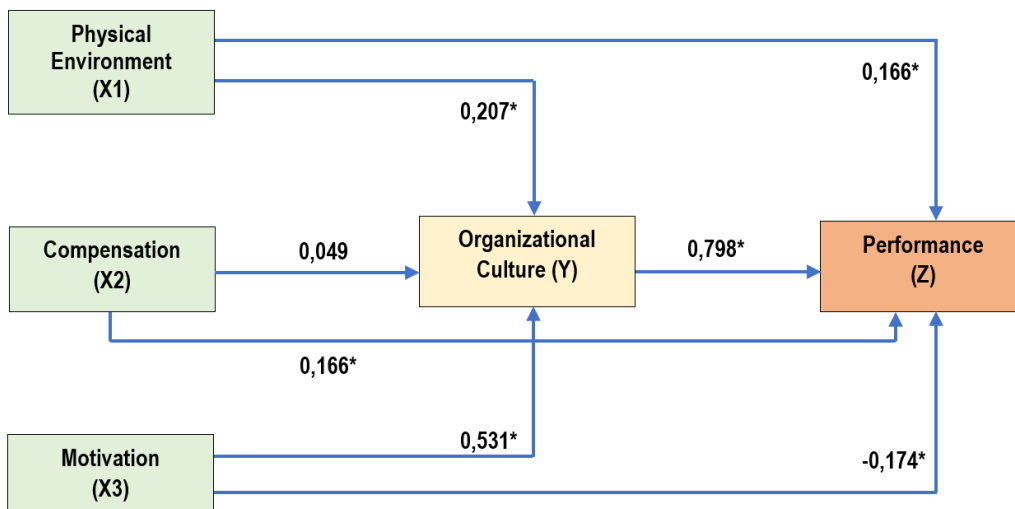
Figure 2. Relationship model of Independent Factors (X1, X2, X3), Intervening Factor (Y), and Dependent Factor (Z) along with their path coefficients (β)

Table IV. Regression Analysis of the relationship between independent variables (physical environment, motivation, and compensation) with intervening variable (organizational culture) and dependent variable (performance)

Path		Standardized Path Coefficient (β)	t-value	R-square
From	**To**			
Regression Model I				
Physical Environment	Organizational Culture	0.207*	2.967	
Financial compensation	Organizational Culture	0.049	0.674	0.473
Motivation	Organizational Culture	0,531*	6.781	
Regression Model II				
Physical Environment	Performance	0,166*	2.886	
Financial compensation	Performance	0,079	1.350	0.664
Motivation	Performance	-0,174*	-2.409	
Organizational Culture	Performance	0.789*	11.992	

*Path is considered significant at p<0.05 if t-value>1.96

Table V. Summary of Path Coefficient Decomposition

Variable	β (direct)	β through Y (indirect)	Total
Physical Environment (X1) to Organizational Culture (Y)	0,207	-	0,207
Physical Environment (X1) to Performance (Z)	0,166	0,207 X 0,798 = 0,165	0,166 + 0,165 = 0,331
Financial compensation (X2) to Organizational Culture (Y)	0,049	-	-
Financial compensation (X2) to Performance (Z)	0,079	-	-
Motivation (X3) to Organizational Culture (Y)	0,531	-	0,531
Motivation (X3) to performance (Z)	-0,174	0,531 X 0,798 = 0,419	(-0,174) + 0,419 = 0,245
organizational culture (Y) to performance (Z)	0,798		

critical work areas. Interruptions and distractions contributed to 45% of medication errors, and the most common interruptions experienced by pharmaceutical staff were from coworkers requiring assistance. This indicated that minimizing potential interruptions and distractions must be attempted during critical pharmaceutical practice. Performance could also be influenced by sound and noise. The results showed that

sound could both decrease and increase pharmaceutical staff performance. A study reviewed by the USP stated that controlled sound could increase the accuracy of prescriptions. This suggested that environmental stimuli were needed to maintain optimal alertness and attention. Another environmental factor influencing performance was room design and workspace that could assist pharmaceutical staff in carrying out their duties. A tightly spaced storage shelves between one medicine box and another increased the potential for errors during dispensing.[33] According to the research findings, there is a need to improve the physical environment by providing a separate room for consultations. This aligns with the importance of having a private consultation room highlighted by Dhital et al. Such a room allows patients to have confidential conversations with pharmacists, especially in sensitive areas such as sexual health, birth control, mental health, skin disease, and weight management.[34]

The significant path coefficient also indicates the direct effect of motivation on performance with a negative coefficient of -0.174 (Odds Ratio (OR) = $e^{-0.174}$ = 0.84), thus it can be concluded that respondent who score high in the motivation section tend to have 0.84 times lower performance than those with low motivation. However, employee performance can be significantly improved by addressing this component indirectly through organizational culture, which has a positive coefficient of 0.245 (Odds Ratio (OR) = $e^{0.245}$ = 1.277). It can be concluded that employee motivation affects performance indirectly by affecting organizational culture. Motivation can be defined as an internal factor in individuals that generates the drive or enthusiasm to work.[35] Pharmaceutical staff motivation was often determined by intrinsic and extrinsic aspects. Intrinsic aspects included a fundamental desire to provide pharmaceutical services to patients, feelings of happiness/satisfaction when able to make a change in patient's lives, and achieving daily goals in the services provided. Meanwhile, extrinsic aspects influencing motivation include work environment, management, cooperation, and constructive feedback.[36] Our current study primarily focuses on external factors when measuring motivation. This may be the factor that causes the negative value of path coefficient (OR lower than 1) on the direct effect of motivation on performance. This research aligns with previous studies indicating that performance is mainly affected by intrinsic motivation rather than extrinsic drive.[37] Additional research is required to evaluate internal motivation elements and its impact on performance.

Further analysis also show that compensation had minimal and insignifance influence on performance, both directly and indirectly. These results were inconsistent with Rahayu et al., who stated that rewards (compensation) significantly influenced staff performance.[38] Another study also reported a correlation between compensation and nurse performance in a hospital in Medan.[39] In case of our study, participants involved were pharmaceutical staff working in Primary Health Centers, consisting of civil servants and other schemes of government employees. Government employees in these roles were subject to rules concerning their compensation, including salary and benefits, which may have influenced the insignifance of the variable. Pharmaceutical personnel at Bandung City's Primary Health Centers have been fulfilling their tasks with professionalism and responsibility, despite getting limited salary. This could be interpreted that even when pharmaceutical staffs did not receive enough financial compensation, they still had performed their task well. This was consistent with the findings of Shi, et al., who stated that salary and welfare was found to be the lowest level regarding job satisfaction.[40] Due to the incorporation of these responsibilities into the regular workload of staff members, health workers often find themselves compelled to undertake additional tasks without receiving commensurate remuneration.[40]

According to this study, pharmaceutical staff performance can be improved by revitalizing the physical environment and providing external and internal motivation. This can indirectly lead to a better organizational culture, ultimately resulting in improved performance at Primary Health Centers. In this study, performance was independently self-assessed by participants through a questionnaire instrument. The results showed that overall performance of pharmaceutical staffs was good with an average score of 4.41±0.45 out of a maximum of 5.00. This served as a limitation for this study where measurement was self-assessed, which may have introduced bias into the results. The bias could stem from the distributed questionnaires. The difficulty has been reduced by performing validity and reliability test before study. Evaluation of staff performance is essential in assessing performance of technical pharmaceutical staff based on their duties and ensuring compliance with established standards. Performance evaluations were also crucial for recognizing skills, identifying weaknesses, and designing improvement strategies.[41] A qualitative investigation is required to further analyze and validate the performance of pharmaceutical professionals, such as data from the human resources department and supervisor evaluations.

Post-pandemic COVID-19 state was another drawback encountered during this study. The Government of the Republic of Indonesia officially revoked the COVID-19 Pandemic Status on June 2023, entering an endemic

period. During this period, community pharmacy was still adapting to the new transformation in providing pharmaceutical care. Pharmacists are experiencing several emerging challenges, and pharmacists have adopted innovative opportunities and strategies to overcome them[42]. As a result, the study's findings may vary and evolve in the next future. Although this study has limitations, the findings provide valuable information on factors influencing the performance of pharmaceutical personnel at Primary Health Centers, contributing to the existing literature.

CONCLUSION

This study concludes that performance of pharmaceutical staffs is influenced by some factors, both directly and indirectly. Physical environment, compensation, motivation, and organizational culture collectively contributes 66.4% impact on pharmaceutical staff performance at Public Health Centers in Bandung. Physical environment dan motivation directly influenced performance significantly, while financial compensation had no direct or indirect impact. Organizational culture significantly influences the performance of pharmaceutical staff by intervening in the physical environment and motivation factors.

STATEMENT OF ETHICS

The study protocol was reviewed and deemed ethically acceptable. Ethical Clearance Certificate No. 65/KEPK/EC/V/2023 was obtained from the Research Ethics Committee of Poltekkes Kemenkes Bandung in May 25th, 2023.

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