



The Influence of Human Resource Management Practices and Organisational Cultural Dynamics on Productivity Outcomes: Insights from Public Scientific Research Institutions in Ghana

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

This study investigates the influence of human resource management (HRM) practices and organisational cultural dynamics on productivity outcomes in public scientific research institutions (PSRIs) in Ghana. Quantitative research designs were employed, using a survey questionnaire of 307 employees. Data analysis was performed with the use of the 26th version of the IBM SPSS data analysis software, descriptive and inferential statistical methods assisted in the analyses of the collected data. The study found that the effect of HRM practices on productivity increases significantly when organisational culture is included in the relationship. Therefore, for higher productivity, organisations need to implement practical human resource strategies that take into account organisational culture dynamics. Again, further research, recommendations are needed to investigate effects of the specific HRM practices on productivity in the organisations, among other insights into organisational performance.

Keywords: Organisational culture; human resource management practices; productivity; scientific research.

1. INTRODUCTION

Human resource management (HRM) is defined as “a function in organisations designed to maximise employee performance in service of their employer’s strategic objectives” [1]. To achieve the functional objectives of HRM, it is required that various human resource management practices like *staffing, compensation and rewards systems, training and development programmes, health and safety provisions, employment relations procedures, performance management systems* and many others are effectively implemented in organisations. Human resource management practices are therefore the drivers for the maximisation of employee performance in organisations [2].

Many organisations over the years have started to manage their human resources in an efficient way to become market leaders in the rapidly changing business environment. Not surprising therefore, the concept of HRM has not only become popular over the past two decades, but also a strategic tool that helps to achieve the aims and objectives of organisations [3]- shifting traditional HRM functions to a more strategic role. And occasionally, this has led to the alignment of HRM systems with strategies of organisations.

Arguably, HRM has evolved through many phases; from the beginning of trade unionism and collective bargaining (industrial revolution) in the 1800’s through the 1900’s with personnel administration [3]. The need for strategic HRM became pronounced in the late 1900’s when globalization, deregulation, and rapid

technological change were on ascendancy, pushing for new innovations in the field of employee management strategies to suit the changing conditions in industries [3]. Following these changes forthwith, traditional HRM functions such as recruitment, performance appraisal, compensation management, etc. were either relinquished to other line managers or outsourced to relevant institutions [4]. Thus, HRM can combined functions like job analysis, recruitment, post-hire activities and team building in a coherent way to improve the overall performance of the human capital of organisations [3,5].

1.1 Human Resource Management Practices and Productivity

Clearly, there is enough evidence to show that effective human resource management practices can lead to increase in productivity in organisations [6,7]. This implies that organisations that aims at increasing productivity would have to manage their human resources efficiently and effectively through prudent HRM strategies.

The term productivity, can be viewed from many perspectives. For example, as a measure of the return on the investment (ROI) of an organisation, or as an indication of how efficiently the resources of the organisation are being utilized [8]. Nonetheless, the term productivity has created a number of definitional challenges in many circles, as there is no common ground with respect to what productivity really is especially in service organisations. It is particularly difficult to determine what service sector productivity is. This situation has

compelled many service sector organisations to customise the parameters regarding the determinants of productivity in their organisations [9]. Therefore, the definition of productivity can be argued to be contextual with organisational variations in terms of indicators for measurement.

The literature has shown the effect of human resource management practices on employee performance in many sectors of the economy. For, example in the construction industry, human resource management practices have been shown to improve workforce performance and productivity [10,11]. Within the same construction industry, Gurmu AT, Ongkowijoyo CS. [11] have proposed a measuring tool to assess the chances of increased productivity by implementing human resource management practices. Also, Human Resource management practices including; recruitment, training, performance appraisal, career planning, employee participation, job definition and compensation have been demonstrated to have a significant impact on performance on public universities [12,13] Ghafoor S. 2015).

1.2 Effect of Organisational Culture on Human Resource Management Practices

Every organisation is made up of a collection of people who create an internal working culture known as organisational culture. The role that organisational culture plays in shaping the internal working environment of organisations is evidenced in literature. Thus, many management researchers agree that every organisation has its own internal culture which shapes managerial assumptions in these business setups [14]. Organisational culture has therefore been defined as the systems of shared beliefs and values that develop within an organisation or within its sub-units and that guides the behaviour of its members [14].

Despite the effect of human resource management practices on employee performance and productivity, the literature has found significant impacts of organizational culture on human resource practices which may as such impact on the overall performance of staff and productivity as a whole. Examples, of this relationship is shown from studies conducted in some selected Nigerian private universities by Adewale OO and Anthonia AA and Eastern Region of Saudi Arabia by Al-Bahussin SA, El-

Garaihy WH in 2013. The findings both studies revealed a close association between organizational culture and HR practices such as recruitment process, training programmes, job performance management, performance of employees, pay structure, and compensation administration.

Again, a study in Saudi Arabia has conformed significant effect of HRM practices on knowledge management capabilities, organizational culture, organizational performance, and organizational learning [15]. National cultures have also been demonstrated to have partial mediating effect on human resource practices in organisations. [16]. Similarly, the effect of Organizational Culture on Human Resource Performance is also significant (Raharjo K, Achmad Rinaldo Fernandes A 2018).

It is not only organizational culture that has shown effect on human resource practices but green organizational culture has also been shown to have influence on human resource practices and employee performance [17]. It could therefore be concluded that organisational cultures are unique to organisations. Also, internal cultures influence organisational productivity because these cultures invariably determine the crop of human resource management practices that organisations employ for improved productivity.

Notwithstanding the importance of human resource management, organisational culture and productivity to business organisations, a scan through literature has revealed a limitation regarding how organisational culture mediates the relationship between human resource management and productivity in business organisations. This study therefore seeks to fill the identified research gap by studying the human resources of public scientific research institutions in Ghana. The general objective of the study is to investigate the mediating role of organisational culture on the relationship between HRM practices and productivity in public those institutions.

1.3 Human Resource Management Practices

This study examines HRM practices in the research institutions; recruitment, selection, performance management, training and development, and incentive pay. The practices were selected because they collectively satisfy the principles of all the sampled research institutions.

1.3.1 Recruitment and selection

Recruitment and selection have remained popular in HRM literature over the years [18] Lievens and Chapman [19]. Recruitment, which exists at the very early stages of the employment relationship, has been defined by Chapman et al. [20] as “the process by which organisations locate and attract individuals to fill job vacancies” [20]. Lievens and Chapman [19] also defined recruitment as means by which organisations find and attract potential job applicants, to keep them interested in the organisation during the selection process, and influence their job choice decision.

On the other hand, selection has been recognised as having considerable interactive effects with recruitment and has been described as the process of choosing suitable applicants to fill job vacancies [19]. This means that the process of recruitment ends when a group of interested applicants are identified for selection to fill available job vacancies and is expected to identify the most suitable applicant from the recruited applicants.

1.3.2 Training and development

Scholars have differentiated training from development. For instance, training has been described as a short - term process which traditionally involves the learning of a set of skills or predictable actions or behaviour and its objective is to improve the current job performance of an employee [21]. Armstrong [18] also defines training as a “systematic development of the knowledge, skills and attitudes required by an individual to perform adequately in a given task or job”. Development on the other hand is the seeking improvement in performing a role, as well as bringing out some form of maturity or growth in individuals [21]. This means that whereas training programmes are directed at achieving specific objectives in the area of knowledge and skills acquisition, development aims at achieving general improvement in the personalities of employees.

1.3.3 Rewards and recognition

Rewards and recognition programmes are two commonly discussed terminologies in human resource management literature [22]. Rewards are usually classified within the overall concept of compensation strategies, which encompasses the deliberate utilisation of the pay system as an

essential integrating mechanism through which the efforts of various sub-units or individuals are directed towards the achievement of an organization’s strategic objectives [22].

1.3.4 Incentive pay

Incentive payments have also been defined as “payments-by-result schemes that may be made on top of a base rate or base pay, to motivate employees [18]. This connotes that incentives may take the form of monetary payments and they usually come about when firms cannot accurately measure the contribution of individual workers [23]. They may also be grouped based on individual based.

Group based incentive pay may take several forms including organisation-wide profit sharing. One disadvantage about group-based incentive schemes is the likely exploitation by free riders [24]. However, this situation could be mitigated by linking incentive pay with additional work practice innovations like assigning unique tasks to individuals within groups [23]. Incentives may also take the form of non-financial recognition. Whereas financial incentives involve the payment of money as the main variable to stimulate improved performance, non-financial incentives are non-monetary in nature. They involve the use of inducements like job enrichment, showing appreciation for work done and opportunity for progression [25]. Some authors usually place recognition under the umbrella of non-financial incentives. For example, Milne [22] described recognition as a “non-financial reward given to employees for high performance.

1.3.5 Performance management

Performance management as “a continuous process of identifying, measuring and developing the performance of individuals and teams and aligning performance with strategic goals of the organisation. Armstrong [18] also notes that the concept is a strategic and integrated process that delivers sustained success to organisations by improving the performance of the people who work in them, and by developing the capabilities of individual employees and teams. This means that the focus of performance management is to improve productivity. The principles of performance management have therefore been described as translating corporate goals into that of Individuals, teams and departments, and rely on consensus rather than control to achieve objectives through two-way communication processes between supervisors and subordinates [26].

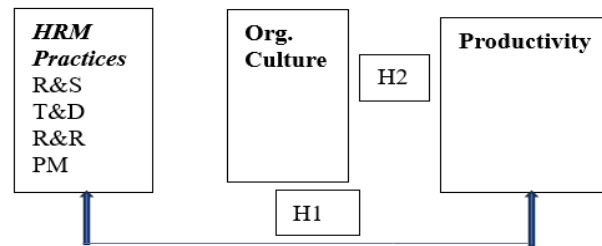


Fig. 1. Conceptual framework

1.4 Hypothesis Testing

Hypothesis 1:

H₀: No significant relationship exists between human resource management practices and productivity in public scientific research institutions in Ghana.

H₁: There is a significant relationship between human resource management practices and productivity in public scientific research institutions in Ghana.

Hypothesis 2:

H₀: Organisational culture is not significantly mediate the relationship between HRM practices and productivity in public scientific research institutions in Ghana.

H₁: Organisational culture significantly mediates the relationship between HRM practices and productivity in public scientific research institutions in Ghana.

1.5 The Conceptual Framework

Fig. 1 shows the conceptual framework of the study. It shows that organisational culture mediates the relationship between HRM practices and productivity. This means that organisational culture can inform HRM strategies towards higher productivity.

2. MATERIALS AND METHODS

2.1 Research Design

This design allowed for testing and validation of already constructed theories about how and to a lesser degree, why a phenomenon occurs [27].

2.2 Population of Study

The population for this study comprised of research grade employees, technologists and

technicians of (5) public scientific research institutions in Ghana. The institutions employ approximately 3500 senior grade employees.

2.3 Sampling Size

At a confidence level of 95% and a margin of error of 5% the sample size for this study was pegged at 340 participants. Table 1 gives the distribution of the sample size.

2.4 Sampling Technique

The nature of the research called for the adoption of the probability sampling technique and hence the simple random sampling method (lottery system) was employed to choose respondents from the larger population [28].

2.5 Data Collection

Data for the study were collected directly from respondents within the study organization. Specifically, the data were sourced from senior members and senior staff of the organisations. The data were collected by use of questionnaires.

2.6 Research Instrument

This study adopted structured questionnaire because they reduce discrepancies, they are easy to administer, data management is less complex and consistency in answers is achieved [29]. The method used is also consistent with research design and approach of the study. A seven-point Likert scale principle was adopted in designing the questionnaire. The Human resource management practices questionnaire [30] organisational culture assessment instrument [31] and the questionnaire for productivity determinants [32] were adopted and tweaked to suit the study.

Table 1. Sample size distribution

Organisation	Number of samples	Percent (%)
Council for Scientific and Industrial Research	276	81.2
Ghana Atomic Energy Commission	29	8.5
Center for Plant Medicine Research	15	4.5
Cocoa Research Institute of Ghana	15	4.5
Kumasi Center for Collaborative Research	5	1.3
N	340	100

For HRM practices, questions were asked on recruitment, selection, performance management, training and development, and incentive schemes. On dominant productivity determinants, individual, human capital factors, and institutional factors were measured. For organisational culture, six key areas were measured as follows; Dominant characteristic, organisational leadership, management of employees, organisational glue, strategic emphases and criteria of success. The questionnaire was in four parts. The phase one collected demographic data of respondent and second section collected data on dominant HRM practices. The next section was concerned with organisational culture, whilst the last part collected data on the determinants of productivity

2.7 Data Analysis

The collected data was analysed in sections by use of a statistical tool known as the IBMSPSS. Firstly, demographic analysis was conducted to identify age, gender, educational qualifications and other characteristics of respondents. Second, descriptive statistics were conducted to identify dominant variables. Then, correlations were run between various variables in line with the objectives. Finally, regression analysis was employed to investigate the mediating role of organisational culture on the relationship between the other variables.

2.8 Reliability

In this study, reliability tests were run by use of the statistical tool (IBMSPSS). The results of the Cronbach's Alpha for HRM practices, productivity and organisational culture were 0.791, 0.823 and 0.914. Hence readers can rely on the findings of this research work.

2.9 Validity

Validity is the precision in which the findings of a research accurately reflect the data (Noble and Smith, 2015). Therefore, to achieve validity of

this study, data collected were analyzed (correlation) with the use of the statistical analytical tool, and the questionnaire was carefully designed. The data was also collected from the right respondents and other existing measures, as discussed, were adopted.

3. RESULTS AND ANALYSIS

3.1 Data Collection and Response Rate

The study was structured to collect data from a population size of 3500. 340 questionnaires were therefore distributed, representing the sample size for the study, out of which 307 were successfully collected. Data from the 307 respondents were then cleaned and analysed with the help of the 26th version of the IBMSPSS software. Results for the study are therefore based on 307 respondents. This represents response rate of 90.3%, and non-response rate of 9.7%. Table 2 gives summary of data collection and response rate.

Table 2. Summary of data collection and response rate

	Counts	Percent (%)
Received	307	90.3
Not Received	33	9.7
Distributed	340	100

The non-response rate of 9.7% is therefore less significant to affect the validity of the results of the study, given the response rate of 90.3%, which is enough to achieve external validity [33]. All 307 received questionnaires were analyzed and the results are presented in subsequent sections.

3.2 Demographic Characteristics

Demographic data collected for the study included gender, age, educational qualifications, years spent in organisation, and institution of

work. This section presents demographic analysis in frequencies and percentages. Table 3 provides data about gender responses. Majority of the respondents, representing 67.4%, were male while 32.6% were female. This suggests that the results will depict masculine view. It also predicts the likelihood of more males than females amongst senior members and senior staff of most research institutions in Ghana.

Table 3. Gender distribution

	Frequency	Percent (%)
Female	100	32.6
Male	207	67.4
Total	307	100

3.3 Number of Years in Establishment

Table 6 provides data on number of years respondents had worked with their respective organisations. The data could predict the level of loyalty of the respondents to their organisations as well as their level of competency. Table 6 shows that most of the respondents, representing 27.7% had worked with their organisations for between 10 and 14 years. 24.2% had worked with their organisations for between 5 years and 9 years whilst 22.8% had worked for 20 years or more. Also, 13% had worked for between 15 to 19 years and 7.2%, for 1 year to 4 years. 4.9% minority had worked for less than 1 year. This suggests that most

employees stay their full course and are replaced after retirement.

3.4 Reliability Test of Constructs

Table 4 presents results of reliability tests (Cronbach's Alpha) for the constructs of the study. Cronbach's Alpha, a measure of internal consistency of constructs, has been adjudged as an accurate estimate of reliability under rather restrictive assumptions [34]. In terms of reliability estimation, literature suggests that for research on predictor tests or hypothesised measures of a construct, reliability coefficient of more than 0.50 is enough [35]. Reliability coefficient is the correlation between two variables which measure the same thing [36]. It has also been established that coefficient of internal consistency increases as the number of items goes up to a certain point [36]. This means that tests with lesser number of test items would also record lower coefficients.

From the table below (Table 4), it can be observed that all the constructs have internal consistency measures of more than the 0.50 threshold and hence reliable. Reliability tests were also conducted on the HRM practices, productivity and organisational culture instruments as composite units and the results are presented in Table 5. As shown in the table (Table 5), the reliability coefficients increased as the test items were increased

Table 4. Reliability test result

Main variables	Reflective constructs	Nos. of observed items	Nos. of retained items	Cronbach's Alpha
HRM Practices	Recruitment	5	5	0.630
	Selection	3	3	0.763
	Performance Management	2	2	0.656
	Training and Development	4	4	0.543
	Incentive System	2	2	0.570
Productivity	Individual Characteristics	2	2	0.508
	Human Capital Factors	3	3	0.641
	Work Environment Factors	4	4	0.776
Organisational Culture	Clan	6	6	0.765
	Adhocracy	6	6	0.723
	Market	6	6	0.743
	Hierarchy	6	6	0.778

Table 5. Reliability test results of main variables

Main variables	Nos. of observed items	Nos. of retained items	Cronbach's Alpha
HRM Practices	15	15	0.781
Productivity	10	10	0.824
Organisational Culture	24	24	0.914

3.5 Validity Test

Two validity issues are presented to inform the validity of the study as well as the meaningfulness of research components (Drost, 2011). These are (a) statistical conclusion validity, (b) internal validity. For statistical conclusion validity, correlation and regression analyses were ran and the results revealed significant reason to presume covariation between the constructs because the degrees of Pearson correlations between all the tested associations were 0.001, which is smaller than the critical value of 0.01 ($p < 0.01$). Regarding the test for mediation, the test statistic for the Sobel test was 2.66 with a p-value of 0.008. The observed p-value of 0.008 which is less than $p < 0.01$ indicates that the association between productivity and human resource management practices is increased significantly when the mediating variable of organizational culture is involved in the regression model. The study therefore passed the test for statistical conclusion validity. Secondly since the nature of the research called for the adoption of the probability sampling technique, the simple random sampling method (lottery system) was employed to choose respondents from the larger population. Also, 90.3% of questionnaires that were distributed across the various institutions were received. This gives the study internal validity because the sample is representative of the population of the study organisations. The results thus confirm reliability and validity of the study.

3.6 Descriptive Statistics

Descriptive statistical methodology was employed to give meaning to the data. Test for central tendency, "a measure of the most typical value or central value in a frequency distribution" (Somekh & Lewin, 2005), was conducted by computing means of variables in the study. The dispersion of the variables from their means were also measured using standard deviation (SD) to identify dominant variables. Results of the descriptive statistics – recruitment, selection,

performance management practices, training and development and motivation systems - are presented subsequently (and shown in Table 4).

First, Table 6 provides summary data on the five (5) recruitment practices that were tested for dominance. These are employee recommendations, print media advertisement, internet, educational institutions, and recruitment agencies. Comparing their means and standard deviations, employee recommendation emerged as the most dominant recruitment practice with the highest mean score of 4.41 and least standard deviation of 1.574. Print media advertisement came up as the second most dominant HRM practice with mean score of 4.36 and standard deviation of 1.761. Recruitment agencies and educational institutions performed better than print media advertisement with mean scores of 1.629 and 1.655, and standard deviations of 3.04 and 2.88 respectively For recruitment over the internet, a mean score of 3.37 and standard deviation of 1.773 put the practice at 3rd most dominant practice. The dominance of print media advertisement could

be attributed to the statutory regulation that requires public institutions to advertise job openings to give equal opportunities to all qualified applicants (Daguah, 2016). The study therefore reveals that employee recommendations rank higher in terms of both mean score and standard deviation and therefore the most dominant recruitment practice in the organisations. This suggests that most employees in the organisations might have worked with or had some relationship with some existing employees before their employment.

Second, three (3) selection practices – panel interview, curriculum vitae and job application forms were tested for dominance (as shown in Table 6). Table 6 gives a summary of the results which indicates that panel interview is the most dominant selection practice in the study institutions with a mean score of 5.78 and standard deviation of 1.582. Curriculum vitae (CV) and job application forms also proved to

be less dominant with mean scores of 5.26 and 5.10 respectively. Their standard deviations (SD) also conformed to their mean rankings with SD scores of 1.872 and 1.884 respectively.

Third, with respect to performance management, two (2) practices, performance appraisal and performance targets, were tested for dominance (as shown in Table 6). With mean and standard deviation scores of 5.30 and 1.667 respectively, performance appraisal emerged as the most dominant performance management practice. Performance target on the other hand trailed with mean and standard deviation scores of 5.18 and 1.943 respectively. This indicates that whereas minority of employees is given performance targets to manage their job performance, most employees' performances are appraised.

Fourth, it can be said that the dominance of four (4) training and development (T&D) practices, mentoring, job instructions, formal educational training and job rotation, were measured (as shown in Table 6).

Table 6 gives summary of the results and indicates that mentoring is the most dominant T&D practice with mean score of 5.54 and standard deviation of 1.515. In close contention is job instructions with mean of 5.26 and a stronger standard deviation of 1.425.

Thus, whereas in term of mean score measurement mentoring emerged most dominant, standard deviation score puts job instructions ahead of mentoring. The contention between the two practices could be attributed to the fact that they are both on-the-job training and mentees have the tendency to receive job instructions from their mentors from time to time.

Given the standard deviation score of 1.774 for job rotation ahead of formal educational training, which has standard deviation score of 2.036 - deviating vastly from the mean - it could be concluded that on the Job training has more dominance in the study organization than off-the-job training. Mentoring and job instructions are therefore identified as the most dominant training and development practices.

Fifth, the study also sought to identify whether incentive systems in the study organisations are predominantly financial or non-financial based. As indicated in Table 6, with a mean score of 4.40 and SD score of 1.690, financial incentives emerged as the most dominant incentive package. A significant number of respondents however indicated that non-financial incentives schemes are in operation in the research organisations with a mean score of 4.02 and standard deviation of 1.747.

Table 6. Dominant HRM practices

HRM Practices	N	Mean	Standarddeviation
Recruitment			
Employee Recommendations	307	4.41	1.574
Print Media Advertisement	307	4.36	1.761
Internet	307	3.37	1.773
Educational Institutions	307	3.04	1.655
Recruitment Agencies	307	2.88	1.629
Selection			
Panel Interview	307	5.78	1.582
Curriculum Vitae	307	5.26	1.872
Job Application Forms	307	5.10	1.884
Performance Management			
Performance Appraisal	307	5.30	1.667
Performance Targets	307	5.18	1.943
Training and Development			
Mentoring	307	5.54	1.515
Job Instructions	307	5.26	1.425
Formal Educational Training	307	4.72	2.036
Job Rotation	307	4.36	1.774
Incentive Systems			
Financial Incentives	307	4.40	1.690
non-financial Incentives	307	4.02	1.747

In summary, Table 6 shows the dominant HR practices under the respective sub-headings (recruitment, selection, performance management, training and development, and incentive systems). For example, (a) employee recommendations (sum of cumulative Likert scale responses: 1353, mean: 4.41, standard deviation : 1.574); (b) panel interview (sum of cumulative Likert scale responses: 1773, mean: 5.78, standard deviation : 1.582); (c) performance appraisal (sum of cumulative Likert scale responses: 1626, mean: 5.30, standard deviation: 1.667); (d) mentoring and job instructions (sum of cumulative Likert scale responses: 1701, mean: 5.54, standard deviation : 1.515 and Mean: 5.26, standard deviation:1.425 respectively); and (e) financial based incentives (sum of cumulative Likert scale responses: 1351, mean: 4.40, standard deviation : 1.747) have been identified as the dominant HRM practices.

Put together, these practices conform to the components required to develop a High-Performance Works System. It is therefore concluded, based on the analysis, that the

dominant HRM practices culminate into the High Performing Works System that exist in the study organisations.

Fig. 2 presents the HPWS which ensures that the organisations have employees with wide range of superior skills and abilities to accomplish their tasks. HPWS also helps the organisations to attain “superior intermediate indicators of firm performance” – the performance indicators that employees have direct control over and also achieve sustained competitive advantage, which improves productivity (Zacharatos, Barling, & Iverson, 2005).

3.7 Dominant Determinant of Productivity

To identify the dominant determinant of productivity, three major determinants were measured based on categories of variables under each determinant [32]. These are individual characteristics, human capital factors and work environment factors (as show in Table 7).

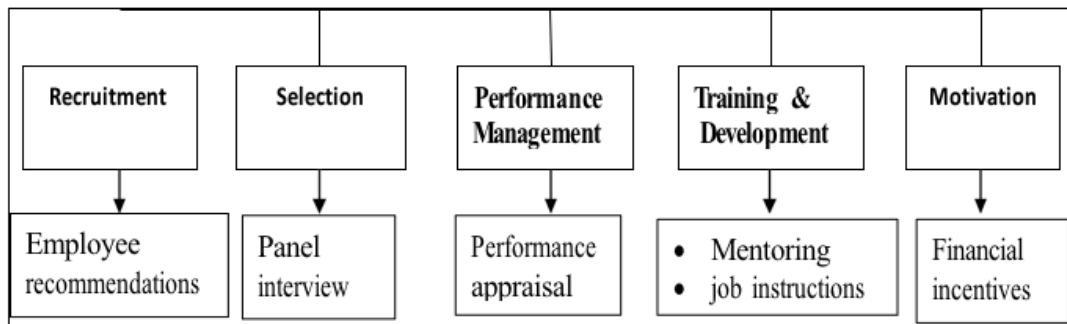


Fig. 2. High performance work system in PSRI in Ghana

Table 7. Dominant determinants of productivity

	N	Mean	Standard Deviation
Individual Characteristics			
Personal Work Discipline	307	6.42	0.739
Self-motivation	307	6.22	0.901
Human Capital Factors			
Skills Gained on The Job	307	6.44	0.588
Job Content Knowledge	307	6.25	0.786
Early Orientation to job	307	5.92	0.723
Work Environment Factors			
Availability of Technology e.g. Internet, Computers, laboratories	307	6.43	0.854
Availability of Equipment for Work	307	6.36	0.858
Resources Available for Work	307	6.28	0.911
Rewards for Work Output	307	5.91	1.214

From the table (Table 7), it can be noted that both variables - personal work discipline and self-motivation - are significant considering the closeness of their mean scores of 6.42 and 6.22 respectively. Personal work discipline also records the least standard deviation of 0.739 compared to that of self-motivation, which scored 0.901. This makes personal work discipline the most dominant variable for individual characteristics.

Again, in Table 7, results of three variables – skills gained on the job, job content knowledge and early orientation to the job – are presented under human capital factors. Skills gained on the job stands out as the most dominant variable, with the highest mean score of 6.44 and least standard deviation of 0.588. This somewhat affirms the high level of dominance of job instructions - and for that matter on-the-job training - under training and development.

Under work environment factors, availability of technology recorded the highest mean of 6.43 and smallest standard deviation of 0.854 over the others, making the variable the most dominant amongst the rest. The mean and standard deviation scores for rewards for work output also seem to agree with choice of respondents between financial and non-financial incentives. Under the most likely assumption that respondents understood rewards for output to mean non-financial incentives, then the data suggests that respondents prefer to be paid, financially than to be rewarded in other ways, as suggested in Table 6.

In summary, Table 7 presents the aggregated statistics of dominant productivity determinant in the organisations in three categories - individual characteristics, human capital factors and work environment factors. With the highest mean of 6.32 and standard deviation of 0.674, individual characteristics, which were measured in terms of self-motivation and personal work discipline, emerged as the most dominant determinant of productivity in the organisations. Work environment factors ranked second with mean score of 6.25 and standard deviation of 0.75, followed by human capital factors with mean and standard deviation of 6.20 and 0.537 respectively. This suggests that respondents take a personal view of their career development and progression, and therefore they put in personal efforts towards productivity in their organisations. That is the respondents may have some personal goals that motivate them to work hard.

It also suggests that the workers share in the achievements of their organisations such that their individual achievements culminate into the overall achievement of their organisational goals. It can therefore be concluded that scientific research in Ghana is highly driven by the individual characteristics of scientists and other workers. This is consistent with some findings in literature. For example, Ndege et al. [32] found that personal factors had a heavy loading on research productivity. It has also been found that personal discipline had the greatest effect of productivity and employee performance in general (Razak, Sarpan, & Ramlan, 2018).

3.8 Dominant Organisational Culture

To identify the dominant culture in the organisations, respondents were asked questions in six key areas – dominant characteristics, organisational leadership, management of employees, organisational glue, strategic emphases, and criteria for success.

The 7- point Likert scale data collection instrument thus collected data on the dominance of 4 cultural archetypes – clan, adhocracy, hierarchy and market – under each of the six key areas in line with the competing values framework [31].

Characteristics of each of the four archetypes were discussed in chapter 2. Means and standard deviations for the variables were computed and aggregated to identify the dominant culture as hierarchical. This is consistent with the work of Schraeder et al (2005) who found that cultures in public sector organisations are characterized by very structured and rules- oriented systems and decision making within departments is usually autocratic, and democratic at the policy level. Procurement is through bids and contracts (Schraeder, Tears, & Jordan, 2005). Analyses for this section were made in line with the Organisational Culture Assessment Instrument [31].

Based on the results in Table 8, all the four types of culture were prevalent in the organisations with the most dominant one being the hierarchical culture with the highest mean of 5.38 and standard deviation of 0.741. This means that the workplace is formalized and structured. Also, procedures direct what people do in the organisations. Leaders are happy with efficiency-based coordination and organisation.

Again, it is crucial to keeping the organisation functioning smoothly. Formal rules and policies keep the organisations together, whilst long-term goals are stability and results, coupled with efficient and smooth running, reliable delivery and continuous planning. Low cost also defines success, and personnel management must guarantee work and predictability [31].

As indicated in the table (Table 7), the second dominant culture is the clan culture with mean score of 5.06 and standard deviation of 0.986. The market and adhocracy cultures followed as third and fourth dominant cultures respectively with means and standard deviations of 4.68 and 1.039, and 4.48 and 0.974 respectively.

3.9 Correlation Analysis

This section presents results of correlations analyses of the dominant variables, in line with the objectives as follows: (a) to examine the relationship between HRM practices and productivity in public scientific research institutions (PSRIs) in Ghana; (b) to examine the relationship between HRM practices and organisational culture in public scientific research institutions (PSRIs) in Ghana; (c) to assess relationship between organisational culture and productivity in public scientific research institutions (PSRIs) in Ghana; (d) to investigate the mediating role of organisational culture on

the relationship between HRM practices and productivity in public scientific research institutions (PSRIs) in Ghana. Correlation analyses show the associations between two or more variables (Gogtay & Thatte, 2017). That is, correlation analyses assist researchers to know whether they are measuring what they intend to measure, and hence serve – to a larger extent – as measures of validity for research work [36]. Tables 6 present results of correlation analyses for objectives 1, 2 and 3. Regression analysis will be employed to test objective 4 in the subsequent section.

The table (Table 9) gives an indication that the degrees of Pearson correlations between all the tested associations are 0.001, which is smaller than the critical value of 0.01 ($p < 0.01$) and thus indicate statistically significant relationships between the variables (Gogtay & Thatte, 2017).

Hypothesis 1:

H_0 : No significant relationship exists between human resource management practices and productivity in public scientific research institutions in Ghana.

H_1 : There will be significant relationship between human resource management practices and productivity in public scientific research institutions in Ghana.

Table 8. Dominant organisational culture

	N	Mean	Std. Deviation
Hierarchy	307	5.38	0.741
Clan	307	5.06	0.986
Market	307	4.68	1.039
Adhocracy	307	4.48	0.974

Table 9. Correlations table

	HRM Practices	Organisational Culture	Productivity
Pearson Correlation	1	0.362**	0.288**
Sig. (2-tailed)		0.001	0.001
N		307	307
Pearson Correlation		1	0.286**
Sig. (2-tailed)			0.001
N			307
Pearson Correlation			1
Sig. (2-tailed)			0.001
N			307

** Correlation is significant at the 0.01 level (2-tailed).

Hypothesis 2:

H₀: No significant relationship exist between human resource management practices and organisational culture in public scientific research institutions in Ghana.

H₁: There will be significant relationship between human resource management practices and organisational culture in public scientific research institutions in Ghana.

Hypothesis 3:

H₀: No significant relationship exists between organisational culture and productivity in public scientific research institutions in Ghana.

H₁: There will be significant relationship between organisational culture and productivity in public scientific research institutions in Ghana.

Hypothesis 4:

H₀: Organisational culture will not significantly mediate the relationship between HRM practices and productivity in public scientific research institutions in Ghana.

H₁: Organisational culture will significantly mediate the relationship between HRM practices and productivity in public scientific research institutions in Ghana.

Table 10 present results of hypotheses tests.

Firstly, as indicated in the table (Table 10), the relationship between HRM practices and productivity shows t-value of 33.392, which is greater than the critical value of $t(306df) = 1.97$ and $p < 0.05$ (0.001). The Confidence Interval is also between -1.8 and -1.6 , which does not cross zero 0. Based on this, the null hypothesis against the alternate that there is no relationship between HRM practices and productivity can thus not be accepted and the alternative hypotheses accepted (Gogtay & Thatte, 2017). The second objective sought to examine the relationship between HRM practices and organisational culture in public scientific research institutions (PSRIs) in Ghana. In line with this, hypothesis 2 was stated, which is that, there will be significant relationship between human resource management practices and organisational culture.

As shown in Table 10, the test generated t-value of 15.9, which is greater than the critical value of

$t(306df) = 1.97$ and $p < 0.05$ (0.001). The Confidence Interval is also between -0.92 and -0.72 , which does not cross zero 0. The null hypothesis of no relationship between HRM practices and organisational culture could therefore not be accepted. The alternative hypothesis is therefore accepted.

Third, based on the objective to assess relationship between organisational culture and productivity in public scientific research institutions (PSRIs) in Ghana, hypothesis 3 was stated as follows, "there will be significant relationship between organisational culture and productivity". From Table 10, the test generated t-value of 19.17, greater than the critical value of $t(306df) = 1.97$ and $p < 0.05$ (0.000). The Confidence Interval is also between 0.8 and 0.9, which doesnot cross zero 0.

The null hypothesis of no relationship between organisational culture and productivity is thus rejected and the alternate accepted. Finally, the last objective sought to investigate the mediating role of organisational culture on the relationship between HRM practices and productivity in public scientific research institutions (PSRIs) in Ghana. The fourth hypothesis was therefore stated as "organisational culture will significantly mediate the relationship between HRM practices and productivity" Table 11 presents results of analysis of variance (ANOVA) test for the dependent and independent variables.

The main interest of ANOVA is to identify the ratio of 'between group variance' and 'within group variance', and thus measures the degree of how relatively greater the difference is between the mean squares of different groups (Kim, 2014).

From Table 11, the F value, which tells the degree at which means of groups are different from each other (Kim, 2014) is 20.878, is greater than the critical value of 5.39 (from the F table; $\alpha = 0.05$).

Larger F values than the critical value means that the means are greatly different and vice versa (Kim, 2014). This means that the dependent and the independent variables are different and hence covariation has been established.

From Table 12, the raw regression coefficient for the association between organizational culture and productivity is 0.247 and the standard error for its regression coefficient is 0.068.

Table 10. Hypotheses table

Pair	Mean	Standard Deviation	Paired differences			t	Degree of Freedom	Sig (2- tailed)
			Standard error Mean	95% Confidence of the Difference				
				Lower	Upper			
HRM Practices: Productivity	1.687	0.885	0.050	-1.787	-1.588	- 33.392	306	0.001
HRM Practices: Organisational Culture	0.817	0.903	0.052	-0.919	-0.716	- 15.863	306	0.001
Productivity: Organisational Culture	0.870	0.795	0.045	0.781	0.959	19.172	306	0.001

Table 11. ANOVA table

Model		Sum of	df	Mean Square	F	Sig.
1	Regression	1021.005	2	510.503	20.878	0.001 ^b
	Residual	7433.457	304	24.452		
	Total	8454.463	306			

a. Dependent Variable: Productivity

b. Predictors: (Constant), HRM Practices, Organisational Culture

Table 12. Coefficients

Model		Unstandardised Coefficients		Standardised Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	47.628	2.231		21.345	0.001
	Organisational Culture	0.247	0.068	0.209	3.623	0.001
	HRM Practices	0.082	0.022	0.212	3.675	0.001

Source: Field Study, 2020

Table 13. Correlations table

	HRM Practices	OrganisationalCulture	Productivity
Pearson Correlation	1	0.362**	0.288**
Sig. (2-tailed)		0.001	0.001
N		307	307
Pearson Correlation		1	0.286**
Sig. (2-tailed)			0.001
N			307
Pearson Correlation			1
Sig. (2-tailed)			0.001
N			307

** . Correlation is significant at the 0.01 level (2-tailed).

To test for mediation effect, Sobel test was conducted. Sobel test is a model for calculating the mediating effect of variables in relationships (Preacher & Leonardelli, 2021). A variable is thus considered a mediator or not by measuring the extent to which it carries the influence of a given independent variable to a given dependent variable. As a rule, mediation is said to occur when; (1) the independent variable significantly affects the mediator, (2) the independent variable significantly affects the dependent variable in the absence of the mediator, (3) the mediator has a significant unique effect on the dependent variable, and (4) the effect of the independent variable on the dependent variable shrinks upon the addition of the mediator to the model (Preacher & Leonardelli, 2021) [37-39].

The correlation table (Table 13) provides justification for meeting rules 1, 2, and 3. Therefore, the test statistic for the Sobel test is 2.66 with a p-value of 0.008. The observed p-value of 0.008 which is less than $p < 0.01$ indicates that the association between productivity and human resource management practices is increased significantly when the mediating variable of organizational culture is involved in the regression model. Simply put, there is a significant effect of a moderation valuable.

4. DISCUSSION

The previous section presents results of correlations and regression between the variables, in line with the objectives, and indicated statistically significant relationships between the four relationships tested. Firstly, the identified significant relationship between HRM practices and productivity conforms to previous knowledge (Delery & Doty, 1996; Ichniowski et al., 1997; Bloom & Reenen, 2010). The identification of positively correlated HPWS-

productivity relationship for the studied organisations also confirms with the argument that the “one fits all” best practice HRM proposal by Pfeffer (1995) is deficient, because the HPWS represent dominant HRM practices in the study organisations. The study therefore supports the best-fit approach to HRM and the argument that various HRM practices have different effects in organisations (Bloom & Reenen, 2010). Next, the identified significant relationship between HRM practices and organisational culture supports the view of the culture-fit model that internal working culture affects HRM practices [31] Schraeder et al (2005) found that organisational culture can hinder the implementation of some HRM practices due to its effects on behaviours of people within an organisation that create values, beliefs, managerial assumptions, rules, and others.

The dominant HRM practices thus generate unique set of HPWS, in operation, different from the previously proposed systems for different organisations studied. Thus, based on the theory of culture-fit, hierarchical culture influenced which HRM practices dominate the organisations. Thirdly, it was identified that a positive relationship exists between organisational culture and productivity, and finally that, as a mediator, organisational culture increases the association between HRM practices and productivity. It has been said in human resource management literature that the stronger the organizational culture, the better the productivity (Schraeder, Tears, & Jordan, 2005; [14]. This confirms the positive association between mediation variable and the dependent variable, as well as the increased association between the dependent and the independent variable, with the inclusion of the mediation variable. Thus, the positions of the RBV theory and the model of culture-fit have been affirmed

by the study due to the identified associations among the variables.

5. CONCLUSION

This article presents the analyses, results, and discussion. It therefore touched on the demographic characteristics of respondents based on gender, age, educational qualification, years with establishment and institution of work. Measurement issues, including reliability and validity tests were also presented. Results of descriptive statistics of the variables, leading to the identification of dominant HRM practices, dominant organisational culture and dominant productivity determinants was also presented. Results of correlations and regression analyses, based on the objectives, were presented and significant relationships were identified amongst the variables. It was also found that the association between HRM practices and productivity is enhanced significantly by organisational culture. The three hypotheses were also tested, and all null hypotheses were rejected. The results were also discussed. In Chapter 5, findings are summarized, conclusions are drawn, and recommendations made.

6. LIMITATION OF THE STUDY

The majority of respondents from the study were from the Council for Scientific and Industrial Research (CSIR). This brings a limitation to the study because the view of employees of the CSIR may override the others in the findings of the study.

7. FURTHER STUDY

The study revealed significant positive relationship between the HRM (HPWS) and productivity in the organisations. It is therefore recommended that further research is conducted into the effects of the individual HRM practices on productivity in the same organisations. Again, further studies are recommended to examine the preferred systems in the study organisations, and their relationship with productivity.

DISCLAIMER (ARTIFICIAL INTELLIGENCE)

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc.) and text-to-image generators have been used during the writing or editing of this manuscript.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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