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Relevance of Henri Fayol's principles of management in contemporary agricultural research organization: Perceptions of agricultural research service scientists

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Abstract

Management plays a crucial role in enhancing organizational effectiveness, particularly in research institutions where multidisciplinary collaboration, innovation, accountability, and stakeholder engagement are essential. Although Henri Fayol's principles of management have been widely recognized as foundational to organizational functioning, empirical evidence regarding their applicability in agricultural research organizations remains limited. The present exploratory study was undertaken to assess the perceived relevance and applicability of Fayol's fourteen principles of management in an Agricultural Research Organization. A structured questionnaire comprising 28 statements representing Fayol's fourteen principles was used to collect data from the serving Agricultural Research Scientists (n=40). The responses were recorded on a four-point Likert scale, analysed using descriptive statistics and a perception index. Results revealed that 85% of the respondents perceived that Fayol's principles are relevant for the effective functioning of contemporary agricultural research organizations. All the fourteen principles were perceived as applicable for the efficient functioning especially the stability of tenure and remuneration receiving the highest applicability scores. The study concludes that Fayol's principles remain highly relevant and provide a valuable framework for strengthening management effectiveness, organizational performance and research excellence in agricultural research organizations.

Keywords: Fayol's principles of management, agricultural research organizations, organizational effectiveness, management principles

Introduction

Management is widely recognized as a critical determinant of organizational effectiveness and success. Regardless of the nature of the organization, the efficient utilization of human, financial, and physical resources depends largely on the quality of management practices adopted (Wren, 1995) ^[13]. Over the years, several management theories have evolved to guide organizational functioning, among which Henri Fayol's Principles of Management continue to occupy a prominent position. Fayol proposed fourteen management principles, including division of work, authority and responsibility, discipline, unity of command, unity of direction, equity, initiative, and esprit de corps, which collectively provide a framework for improving organizational efficiency, coordination, leadership, and productivity. Although these principles were formulated more than a century ago, their relevance continues to be acknowledged in contemporary organizations operating in diverse sectors (Dhanda, 2024) ^[4]. Many modern management practices related to strategic planning, organizational coordination, teamwork, communication, accountability, and performance monitoring are rooted in the foundational concepts advanced by Fayol. Consequently, his principles continue to serve as important reference points for understanding organizational behaviour and management effectiveness.

Agricultural research organizations operate in an increasingly

complex environment characterized by multidisciplinary research, stakeholder engagement, technology development, resource constraints, accountability requirements, and rapidly evolving societal needs. Effective management is therefore essential for ensuring that research outputs are generated efficiently and translated into tangible benefits for the farmers and other stakeholders. International organizations such as the Food and Agriculture Organization (FAO), the World Bank, and the Consultative Group on International Agricultural Research (CGIAR) have consistently emphasized the importance of strategic planning, leadership, human resource management, coordination, communication, monitoring, and evaluation in enhancing the effectiveness of agricultural research systems. Notably, many of these management dimensions closely align with Fayol's classical functions of planning, organizing, coordinating, commanding, and controlling. Previous studies have highlighted the importance of organizational and managerial considerations in strengthening interdisciplinary and multidisciplinary agricultural research programmes (Merrill-Sands *et al.*, 1991) ^[9]. Similarly, the ability to assess and demonstrate organizational performance has been recognized as a key challenge for agricultural research institutions worldwide (Peterson *et al.*, 2003) ^[12]. Management development programmes have also been identified as effective mechanisms for enhancing leadership and managerial

competencies among employees at different organizational levels (Gareth and Sharon, 2005) ^[6]. Human resource development initiatives that strengthen managerial capabilities contribute significantly to organizational effectiveness, employee motivation, and institutional performance (Mittal, 2013) ^[11].

Within the Indian agricultural research system, efforts have been made to improve organizational efficiency through administrative reforms and digital governance initiatives. For example, Dhaiya *et al.* (2026) reported that the implementation of an e-governance-based organizational management model in the Indian Council of Agricultural Research (ICAR) improved efficiency in training management and approval processes. However, despite the continued relevance of management principles in organizational functioning, there is limited empirical evidence on how scientists perceive the applicability of classical management principles within agricultural research organizations. In particular, no systematic study has examined the relevance of Henri Fayol's principles of management in the context of ICAR institutes. Agricultural Research Service (ARS) scientists play a pivotal role not only in conducting research but also in managing projects, coordinating multidisciplinary teams, supervising human resources, administering research infrastructure, mobilizing external funding, and engaging with diverse stakeholders. Their perceptions can therefore provide valuable insights into the extent to which classical management principles are reflected in the functioning of agricultural research organizations and identify areas requiring managerial strengthening.

The functioning of agricultural research organizations presents a unique management context characterized by multidisciplinary research, scientific autonomy, long-term research projects, external stakeholder engagement, technology dissemination, and accountability for public investments. Although Henri Fayol developed his principles in an industrial setting, several of these principles remain highly relevant to contemporary agricultural research organizations. Given the increasing complexity of agricultural research and extension systems, understanding how scientists perceive the relevance and application of these principles can provide valuable insights for strengthening organizational management, leadership development, human resource policies, and institutional performance. Assessing the extent to which Fayol's principles are reflected in the functioning of agricultural research organizations may therefore contribute to the development of more effective management strategies for achieving research excellence and societal impact. Against this background, the present exploratory study was undertaken to assess the perceptions of ARS scientists regarding the relevance of Henri Fayol's principles of management in their organization. The study also seeks to identify management dimensions that require greater attention for enhancing organizational effectiveness, employee engagement, and institutional performance in agricultural research organizations.

Methodology

The study was conducted among Agricultural Research Service (ARS) scientists working at the ICAR- Central Institute of Brackishwater Aquaculture (ICAR-CIBA),

Chennai. The institution was selected considering the accessibility of respondents, familiarity of the researcher with the organization, and the time and logistical constraints associated with data collection. ICAR-CIBA is a national research institute under the Indian Council of Agricultural Research (ICAR), mandated to undertake research and provide technological support for sustainable coastal aquaculture. Established in 1987 and headquartered in Chennai, the institute undertakes multidisciplinary research encompassing technology development, dissemination, capacity building and knowledge management in brackishwater aquaculture. The organizational structure and multidisciplinary nature of research activities provided an appropriate setting for examining the perceived relevance and applicability of Henri Fayol's principles of management in an agricultural research organization.

Development of the measurement instrument

A structured questionnaire was developed based on review of relevant literature and by operationalizing each of Fayol's principles in relation to the functions and working environment of agricultural research organizations. The questionnaire consisted of 28 statements, with two statements representing each of Fayol's 14 principles. The questionnaire was content validated by subject matter specialists to ensure that it is measuring the relevance and applicability of management principles under consideration. A four-point Likert-type scale was employed to record the responses. The response categories were assigned scores ranging from 1 to 4, with higher scores representing a greater degree of perceived relevance/applicability of the respective management principle. The internal consistency and reliability of the questionnaire were assessed using Cronbach's alpha coefficient. The scale yielded a Cronbach's alpha value of 0.817, indicating good internal consistency and suggesting that the items collectively provided a reliable measure of the perceived relevance and applicability of Fayol's management principles in the study organization. Primary data were collected from 40 serving ARS scientists representing different levels of service and functional responsibilities at ICAR-CIBA. The responses obtained for the 28 statements were aggregated to construct an overall Perception Index. Since each of the 28 statements was scored from 1 to 4, the maximum possible score was 112 (28×4), while the minimum possible score was 28 (28×1). The perception index for each respondent was calculated as: Perception Index (%) = (Obtained score / Maximum possible score) $\times$ 100. The index was used to indicate the overall level of perceived relevance and applicability of Fayol's principles within the organization. In addition to the overall index, the responses were examined principle-wise to identify the management principles perceived to have relatively higher or lower relevance and applicability. Descriptive statistical measures, including frequency, percentage, mean and standard deviation, were used to summarize and interpret the responses.

Results and Discussion

(i) Implementation of Fayol's Management Principles in ICAR Organizations

The analysis revealed that the organizational structure and functioning of ICAR institutions reflect the practical

application of most of Henri Fayol's principles of management (Table -1). ICAR institutes are organized into specialized divisions and disciplines based on their respective mandates, thereby demonstrating the principle of division of work. Authority and responsibility are clearly distributed through a hierarchical administrative structure comprising the Director, Heads of Divisions, Project Coordinators, and Principal Investigators. Similarly, the scalar chain is evident through the reporting structure extending from scientists to institute-level authorities and ultimately to the concerned Deputy Director General at ICAR headquarters.

Research planning and implementation are guided through institutional mechanisms such as the Institute Research Council, where projects are scrutinized, approved, and allocated resources. The presence of Project Monitoring and Management Units facilitates coordination across research programmes and supports unity of direction. Administrative and finance units ensure adherence to government regulations, financial discipline, and accountability. Furthermore, institutional and societal goals are prioritized over individual interests through performance appraisal and organizational accountability mechanisms. The continuity of scientific, technical, administrative, and financial personnel also reflects the principle of stability of tenure. Overall, the findings suggest that Fayol's management principles are substantially embedded within the operational framework of ICAR research organizations.

(ii) Perception of Researchers on the Relevance of Fayol's Principles

The perception analysis indicated more than half of the respondents (51.85%) perceived the principles as highly relevant, while 33.33% considered them reasonably relevant. Thus, nearly 85% of the respondents regarded Fayol's principles as relevant to highly relevant for the effective functioning of agricultural research organizations (Figure-1). The principle-wise relevance scores further demonstrated that all fourteen principles were perceived as highly relevant, with scores ranging from 75.00 to 95.75 percent (Table -3). Stability of tenure received the highest relevance score (95.75%), followed by remuneration (93.50%), unity of command (89.75%), scalar chain (88.13%), initiative (87.88%), and primacy of common interest over personal interest (87.88%). These findings suggest that respondents place considerable importance on organizational stability, fair reward systems, clear reporting relationships, and opportunities for innovation. The findings are consistent with review of studies emphasizing the importance of management systems, leadership development, competency enhancement, and organizational governance in improving institutional performance in the agricultural research organizations (Table-2). Dahiya *et al.* (2026)^[3], for example, reported that competency-based management and e-governance interventions contributed significantly to

organizational efficiency and employee development in ICAR institutions.

(iii) Perceived Applicability and Usefulness of Fayol's Principles in Agricultural Research Organizations

The applicability assessment showed that respondents perceived all fourteen principles as useful and advantageous for the efficient functioning of agricultural research organizations (Table 4 and Figure 2). Mean applicability scores ranged from 3.06 to 3.83 on a four-point scale, indicating a consistently high level of agreement regarding their usefulness.

Among the principles, stability of tenure recorded the highest mean score (3.83 ± 0.17), followed by remuneration (3.74 ± 0.26) and unity of command (3.59 ± 0.22). The high ranking of stability of tenure suggests that scientists perceive job security as an essential factor influencing long-term research planning, continuity of expertise, institutional memory, and strategic organizational growth. Similarly, respondents believed that remuneration should adequately reflect the responsibilities, effort, and contributions associated with scientific positions. The high score for unity of command highlights the importance of clear reporting relationships and coordinated task allocation in enhancing organizational efficiency.

Relatively lower scores were observed for discipline (3.06 ± 0.31), team spirit and sense of belonging (3.19 ± 0.43), and authority-responsibility balance (3.22 ± 0.30). Discussions with respondents suggested that younger scientists were less inclined to view disciplinary measures alone as a driver of research productivity and innovation. Likewise, while teamwork and mutual trust were perceived to exist within the organization, respondents felt that greater efforts were required to strengthen esprit de corps, collaboration, team work and organizational belongingness. The comparatively lower rating for authority and responsibility reflecting the operational challenges arising from shortages of technical and support staff, which often compel scientists to undertake routine administrative and technical tasks in addition to their research responsibilities.

Overall, the findings demonstrate that effective management practices contribute substantially to research productivity, accountability, organizational adaptability, and institutional performance. The results also reinforce observations from previous studies which emphasize the importance of leadership, coordination, resource allocation, monitoring, and stakeholder engagement in enhancing the effectiveness of agricultural research systems (Table-2). Strong coordination among researchers, extension personnel, administrators, and end-users remain essential for successful technology development, dissemination, and eventual contribution to agricultural growth, livelihood enhancement, and societal well-being.

Table 1: Illustration of Fayol's Management Principles in Agricultural Research Organizations

Principle	Application in ICAR Research Organizations
Division of Work	Research disciplines, extension, administration, finance, HR
Authority & Responsibility	Director, HoDs, Principal Investigators, Project Coordinators
Unity of Direction	Alignment with ICAR Vision 2047 and institute mandates
Scalar Chain	ICAR HQ → Deputy DG → Institute Director → HoD → Scientist
Initiative	Scientists developing technologies, DSS, mobile apps, innovations
Esprit de Corps	Multidisciplinary project teams and institute culture
Order	Research infrastructure, laboratories, experimental farms, data management
Discipline	Research ethics, project timelines, financial compliance
Centralization/Decentralization	Institute-level decisions versus ICAR policy decisions
Stability of Personnel Tenure	Retention of skilled scientists and technical staff
Unity of command	Monthly tasks and clear reporting systems ensure efficiency
Primacy of common interest over the personal	Institutional and societal goals must take precedence over individual preferences
Remuneration	Remuneration policy reflects the level of effort, responsibility of the cadre and fair enough.
Equity	Fairness in resource allocation as per the requirement and availability, performance appraisal, and career progression

Table 2: Review of major studies applying Fayol's principles in agricultural research organizations

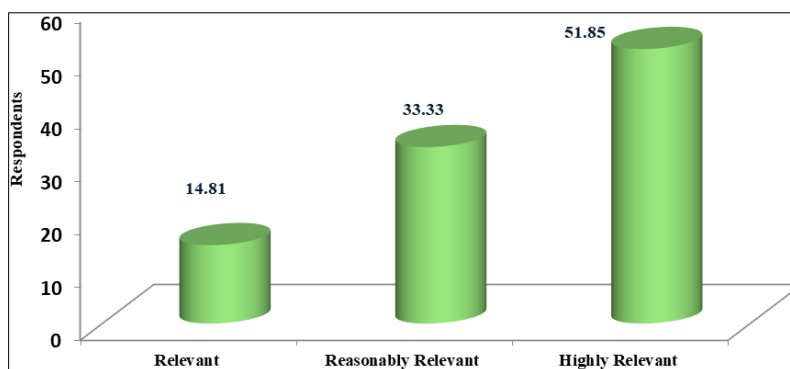
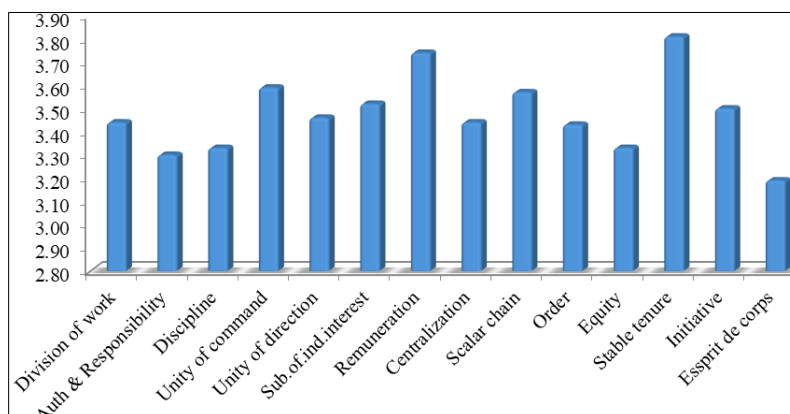
Study	Organization Type	Key Management Aspects Studied	Major Findings
Peterson, Gijbers & Wilks (2003) ^[12] – ISNAR OPAS	Agricultural Research Organizations	Planning, HRM, monitoring, organizational assessment	Effective management systems significantly improve research productivity and accountability.
ISNAR Impact Assessment (FAO,1997) ^[5]	National Agricultural Research Systems (NARS)	Strategic planning, HRM, information systems, institutional development	Organizations with stronger management systems performed better and adapted more effectively to change.
ISNAR NARS Effectiveness Studies (Anderson, 2004) ^[2]	National Agricultural Research Systems	Governance, resource allocation, coordination, extension linkages	Research effectiveness depends heavily on organizational structure, programme coordination, monitoring, and extension linkages.
Merrill-Sands <i>et al</i> (1991) ^[9]	Agricultural Research Systems	Client-oriented research management	Strong coordination among researchers, extension personnel, and farmers is critical for successful technology development.
Kormawa <i>et al.</i> (2018) ^[8]	African Agricultural Research Organizations	Information management, leadership, organizational culture	Leadership support, organizational culture, and change management determine successful institutional performance.
Alok Kumar <i>et al.</i> (2022) ^[1] .	ICAR-NAARM Leadership Development Study Indian Agricultural Research & Education System	Leadership and management development	Trained research managers showed improved managerial effectiveness and institutional performance.
Dahiya <i>et al.</i> (2026) ^[3]	ICAR Institutions	HR management, competency development, e-governance	Competency-based management systems improve institutional efficiency and employee development.

Table 3: Perceived relevancy of Henry Fayol's principles in the ICAR institutions

Sl. No	Principle	Perceived relevance score in%
1.	Division of work between departments	85.63
2.	Authority & Responsibility	80.38
3.	Discipline	75.00
4.	Unity of command	89.75
5.	Unity of direction	86.00
6.	Primacy of common interest over the personal	87.88
7.	Remuneration	93.50
8.	Centralization	86.63
9.	Scalar chain	88.13
10.	Order	85.13
11.	Equity	82.63
12.	Stable tenure	95.75
13.	Initiative	87.88
14.	Team spirit and sense of belonging	79.75

Table 4: Perceived applicability of Fayol's principles in ICAR research institutions

Sl. No	Principle	Statement	Mean perception score
	Division of work between departments	Specialization of scientists across disciplines such as aquaculture, genetics, nutrition, pathology, economics, and extension, enabling greater efficiency and scientific excellence.	3.43 ± 0.33
	Authority & Responsibility	Delegation of authority and responsibilities to project leaders, heads of divisions, and research coordinators who are entrusted with decision-making authority while remaining accountable for outputs and outcomes	3.22± 0.30
	Discipline	Discipline is essential for ensuring adherence to research protocols, institutional regulations, ethical standards, and project timelines.	3.06±0.31
	Unity of command	Well-organized monthly tasks greatly enhance coordination and efficiency leading to effective performance of scientists engaged in multiple projects.	3.59±0.22
	Unity of direction	Alignment of individual and divisional activities with broader institutional goals, national agricultural priorities, and strategic research plans.	3.44±0.24
	Primacy of common interest over the personal	Institutional and societal goals must take precedence over individual preferences and personal goals are harmonised with the institution's goal and are mutually inclusive.	3.52±0.16
	Remuneration	Remuneration policies should adequately reflect the level of effort, responsibility, and contribution associated with scientific positions.	3.74±0.26
	Centralization	Decision-making authority is relatively centralised, which enhances agility, balanced and facilitate consistency.	3.42±0.25
	Scalar chain	Clarity in communication and administrative processes while facilitating coordination across different organizational levels.	3.52±0.36
	Order	Ensuring optimal utilization of laboratories, experimental facilities, infrastructure, human resources, and financial resources for societal development.	3.40±0.35
	Equity	Positive organizational climate through fairness in resource allocation, workload distribution, performance appraisal, and career progression.	3.30±0.46
	Stable tenure	Permanency of job greatly influence long-term vision and strategic planning both at office and home.	3.83±0.17
	Initiative	Employee initiatives are recognised but its successful completions need cooperation from the concerned units.	3.51±0.24
	Team spirit and sense of belonging	Mutual trust, team spirit and sense of belonging are visible but needs a progressive change.	3.19±0.43

**Fig 1:** Researchers perception on the relevance of Fayol's principles**Fig 2:** Perception of researchers on the applicability Fayol's principles of management

Conclusion

The study demonstrated that Henri Fayol's principles of management continue to be highly relevant and applicable in contemporary agricultural research organizations. The organizational structure, administrative systems, project management mechanisms, and accountability frameworks of ICAR institutions inherently reflect the practical application of Fayol's management principles. The scientists perceived that all fourteen principles as relevant to highly relevant for improving organizational efficiency, research productivity, and institutional effectiveness. Stability of tenure, fair remuneration, and unity of command emerged as the most valued principles, highlighting the importance of organizational continuity, motivation, and clear reporting relationships in research organizations. The relatively lower ratings for discipline, authority-responsibility balance, and esprit de corps suggest areas where organizational reforms and human resource interventions may be required. Respondents emphasized the need for adequate technical and support staff to ensure that scientific personnel can focus on research, innovation, and knowledge generation rather than routine operational activities. The findings confirm that effective management is an important determinant of research excellence, organizational adaptability, stakeholder engagement, technology dissemination and societal impact.

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