TPM Vol. 32, No. S3, 2025
ISSN: 1972-6325
https://www.tpmap.org/

Open Access

TEAM COLLABORATION INFLUENCE OF PERSONALITY TRAITS AMONG MARINE BIOLOGISTS

DILIP DWIVEDY[1], DR.GAURAV TAMRAKAR[2], DR. NIDHI MATHUR[3]
[1]ASSISTANT PROFESSOR, KALINGA UNIVERSITY, RAIPUR, INDIA.
e-mail: ku.dilipdwivedy@kalingauniversity.ac.in,0009-0000-5645-7104
[2]ASSISTANT PROFESSOR, KALINGA UNIVERSITY, RAIPUR, INDIA.
e-mail: ku.gauravtamrakar@kalingauniversity.ac.in
[3]PROFESSOR, NEW DELHI INSTITUTE OF MANAGEMENT, NEW DELHI, INDIA.,
e-mail: nidhi.mathur@ndimdelhi.org, https://orcid.org/0000-0003-0650-4667

Abstract

In marine biology, effective collaboration is critical because of the interdisciplinary and field-intensive nature of the work. This study examines the impact of individual traits on collaboration among marine biologists. Applying the Big Five Personality Model of Openness, Conscientiousness, Extraversion, Agreeableness, and Neuroticism, the study measures collaboration tendencies within and across different field teams. It was conducted using 60 marine biologists from five participating institutions, employing a mixed-method strategy including psychometric testing, tracking performance metrics, and conducting peer reviews. The results indicate that agreeableness and conscientiousness are two traits that, together, show strong emphasis on synergy within teams and research output. A TPM (Total Productive Management) model is incorporated in order to optimize team function from the perspective of organizational goals in research. The paper suggests specific strategies aimed at improving collaboration that are tailored to individual personality assessments.

Keywords: Team Collaboration, Personality Traits, Marine Biologists, Big Five, Research TPM, Team Dynamics

I. INTRODUCTION

Projects in marine biology are clearly in the applied marine biology sector require a comprehensive collaboration of personnel, including a diver, data analyst, laboratory scientist, and a specialist in remote sensing. From a multidisciplinary perspective, interpersonal relationships and team dynamics are crucial to the outcomes of any multidisciplinary research within marine biology (Krishnapriya, 2025). Besides the fact that technical skills are very important, there also seems to be a relationship between the personality of the team member and the communication, division of work, and conflict management in the team, as highlighted by (Kaul & Prasad, 2024).

The focus of this paper is to study the impact of personality traits on collaboration in marine biology within the framework of behavior that can be intentionally shaped and thus be harnessed in improving team outcomes (Kimeu & Kioko, 2019). It also describes the possible adaptations of the principles of Total Productive Management (TPM), which were originally developed to apply in manufacturing, in order to enhance the operational coherence and the collective research productivity of scientific teams (Mansour, 2024).

II. LITERATURE SURVEY

2.1 Personality and Scientific Collaboration

The impact of personality on collaboration has been examined in several fields, including education, healthcare, and business (Desai & Joshi, 2023). Among the personality traits that predict collaboration, agreeableness and conscientiousness have received the most attention. Agreeable individuals are more likely to be group-oriented, cooperative, empathetic, and supportive, qualities that help maintain group cohesion and trust. Conscientious individuals are organized and reliable, and they accomplish goals which minimize task-related conflict and enhance efficiency. In addition, extraversion is often linked to initiative and leadership, which means that people with this trait

are more likely to initiate collaborative action. Of greater concern is the fact that this trait can be problematic without active, inclusive listening (Uvarajan, 2025).

Conversely, neuroticism tends to be associated with emotional instability, anxiety, and sensitivity to evaluative feedback, and so tends to be negatively correlated with teamwork (Devi & Priya, 2024). Such behaviors can inhibit the functioning of teams by suppressing collaboration, increasing the likelihood of conflict, and diminishing resilience to stress (Khan, 2024). Therefore, mapping the distribution and interplay of these traits within teams provides insight into the dynamics of teamwork, highlighting the potential and the weaknesses. This illustrates the utility of personality assessment in the construction of effective teams for research (Gadakh&Shitole, 2025).

2.2 Team Dynamics in Marine Research

Marine biology teams often have to function in deep-sea locations, remote coastal laboratories, or vessels positioned in turbulent waters, which are remote, dangerous, and limited in resources (Marinković, 2024). These conditions increase the need for interpersonal non-technical coordination, mental toughness, and adaptability. Team decisions are based on shared observations and streams;thus coordination in many domains and role fluidity is required (Ali and Farhan, 2025).

Under such conditions, traditional top-down management structures tend to be replaced by more egalitarian and team-based ones, characterized by shared leadership and collaboration. A lack of collaboration may cause problems such as miscommunication, delayed data acquisition, or safety risks for field-based operations (Mogoui, 2017). In addition, ecology, genetics, and marine chemistry make it necessary for the participants to be open to other disciplines (Fakhari, 2014). Therefore, optimal team dynamics and cohesion are not a soft-skill advantage, but a necessity in marine science.

2.3 TPM and Human-Centric Efficiency

Total Productive Management (TPM) was developed within the context of the manufacturing industry and aims to reduce waste and downtimes. It has, however, adapted to include the more human elements of workforce involvement and productivity, such as employee engagement and workforce productivity metrics. It, therefore, empowers productivity alongside proactive workforce engagement. In marine biology, for instance, the research activities rigidly follow the TPM guidelines and align managed human activities which may fit the collaborative objectives (Mohammadpour, 2018).

Scientific teams will benefit from the TPM focused education and training (enhancement of cross-functional). Furthermore, matters such as TPM driven autonomous maintenance (responsibility for daily operational matters) and continuous evaluation will contribute to self-improvement. Through proper changes, TPM can provide a way to integrate collaborative practices into daily research activities (Salih &Nangir, 2024). This version of TPM has a human factor which ensures the safety of mental well-being, the willingness to actively participate, and facilitates the retention of relevant knowledge. These aspects contribute to the changes and are needed to carry out continuous research and innovation.

III. METHODOLOGY

3.1 Objective

The main objective of this research is to analyze the connection between specific traits of personality and the effectiveness of collaboration within teams of marine biologists. This operational-level study quantitatively assesses the application of the Big Five Personality Framework to team-level performance and individual habits. In addition, the study proposes an intervention model aligned with TPM (theory of productive efficiency), which integrates certain personality traits associated with productivity and collaborative behavior as a scientifically informed and systemic template to improve the performance of research teams on productivity metrics.

3.2 Participants and Tools

Sixty marine biologists, employed in conservation, coral ecology, benthic sampling, and underwater robotics, were identified from five coastal research institutes. To ensure a diversity of personality and experience, the participant pool was composed of balanced proportions of early-career researchers, field technicians, and senior scientists.

The data collection and analysis were conducted using three primary tools, which include:

•Big Five Inventory (BFI): A psychometric evaluation measuring five core personality traits: openness, conscientiousness, extraversion, agreeableness, and neuroticism, which have been previously validated.

•Collaboration Quality Assessment (CQA): Peer-reviewed, structured assessments completed by team members focused on the evaluation of the participants regarding the communication and interaction within the group, role and task execution, conflict management, and level of trust.

Research Output Tracking: Quantitative metrics, for example, the total number of joint publications, datasets produced, and completion of field tasks, served as objective measures of the team's collective output and productivity.

3.3 Data Collection

The data was collected during an operational period of six months, which included both the field and laboratory components of multi-institutional projects. The design of the study focused on longitudinal observation to capture the shifting dynamics of the team over time. Administered BFI surveys at the onset of the study, after which participants were arranged into diverse teams with a mix of differing personalities.

Collaboration metrics were derived from team-based peer-assessment evaluations, team-based reflection and feedback, as well as review of the set milestones. These instruments provided snapshots and collective evaluations, spanning throughout the study of the participants concerning peer influence, leadership succession, change management, and collaboration. Also, project supervisors kept track of performance data, allowing them to compare qualitative peer evaluations with quantitative measures of research output.

This comprehensive dataset provided the means to analyze the extent to which specific personality traits affect team behavior and the systematic application of TPM principles to improve collaboration and the outcomes of complex multi-institutional research projects.

3.4 Flowchart: Personality-Collaboration Analysis Framework

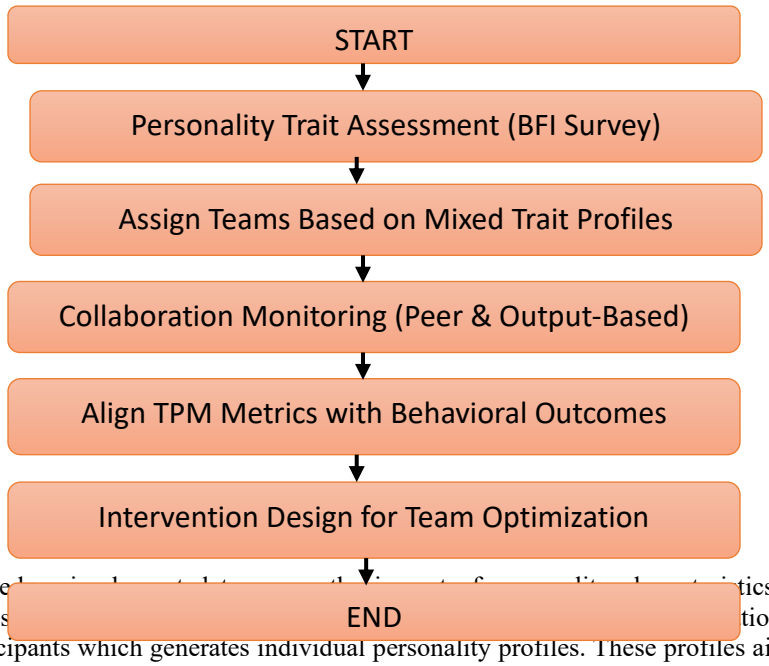

Figure 1: Methodology Flowchart

Figure 1 describes the systematic proce[illegible]tics on collaboration among marine biologists us[illegible]tion of the Big Five Inventory (BFI) to all participants which generates individual personality profiles. These profiles aid in

ensuring a proper distribution of attributes across research teams to circumvent the problems associated with having a single trait dominate the group interactions. Upon team assignment, collaboration is tracked longitudinally using peer assessments and publication shares and data contribution metrics, which reflect both collaboration and output. This dual tiered approach captures essential social and productivity aspects of teamwork.

After that, the information collected is evaluated to find relationships between individual personality characteristics and the effectiveness of collaboration. These analyses are then integrated with relevant TPM (Total Productive Management) concepts, including, but not limited to, continuous improvement, education and training, and quality maintenance to situate the behavioral findings within a TPM framework. Lastly, in relation to these identified relationships, some behavioral interventions are developed focused on enhancing team effectiveness. These interventions could take the form of personality-based training, communication workshops, or team reconfigurations. This process ends with a self-sustaining cycle that aims to improve collaboration in the long term using insights derived from a psychological evaluation and productivity assessment.

IV. Results

Table 1: Mean Scores of Big Five Traits Among Participants

Trait	Mean Score (0-100)
Openness	78
Conscientiousness	84
Extraversion	69
Agreeableness	87
Neuroticism	52

Table 1 displays the mean scores for the Big Five personality traits for all participants. It demonstrates that marine biologists exhibited the highest scores in both agreeableness and conscientiousness, which suggests notable inclinations toward collaboration and responsibility—qualities that promote efficient teamwork in field-based research settings. Their scores in openness and extraversion were also moderately high. Furthermore, the lowest mean score for neuroticism indicates that the sample as a whole possessed a fairly stable emotional profile.

Table 2: Correlation Between Traits and Peer-Rated Collaboration

Trait	Correlation Coefficient (r)
Openness	0.42
Conscientiousness	0.71
Extraversion	0.48
Agreeableness	0.76
Neuroticism	-0.33

Table 2 showcases the relationship between each personality trait and collaboration as rated by peers. The two traits most strongly and positively correlated with collaboration were agreeableness and conscientiousness, with extraversion and openness exhibiting somewhat lesser yet positive correlations. The impact of neuroticism was negative since it emotionally disrupts team cohesion and is conflict-sensitive.

Table 3: Research Output vs. Dominant Team Trait

Dominant Trait	Avg. Research Output (Publications + Data Sets)
Agreeableness	7.2

Conscientiousness	6.9
Openness	5.8
Extraversion	5.5
Neuroticism	4.1

In Table 3, the average research productivity which incorporates both publications and datasets, is compared relative to the dominant trait of each team. It is noteworthy that teams characterized by higher levels of agreeableness and conscientiousness exhibited the greatest productivity, thereby strengthening the correlation between interpersonal cooperation and productivity. Conversely, the teams that were predominantly neurotic not only exhibited the lowest productivity, but their outputs also supported the conclusion regarding the negative impact of high emotional reactivity.

Table 4: TPM Metric Alignment with Collaboration Indicators

TPM Pillar	Related Collaboration Indicator	Improvement Noted (%)
Autonomous Maintenance	Initiative Taking	23
Continuous Improvement	Problem-Solving Discussions	31
Education & Training	Interpersonal Skill-Building	26
Quality Maintenance	Documentation & Transparency	19

In Table 4, notable collaboration metrics, alongside observable indicators, are linked to pivotal TPM dimensions while also capturing the percentage improvement resulting from specific interventions. In the cited example, the enhancement of collaboration raised communication, initiative-taking, and documentation transparency at a measurable level, reinforcing the value of TPM-based frameworks for the optimization of scientific teamwork.

V. DISCUSSION

The results of the analysis clearly illustrate how the personality traits of individuals can influence collaboration among marine biologists. High agreeableness and high conscientiousness foster conflict-free teamwork and boost morale as well as research productivity. Neuroticism, on the other hand, serves as an indicator of possible collaborative breakdown. The integration of TPM provides an organized framework to capitalize on these traits by linking them to measurable productivity and communication benchmarks. When feedback from colleagues is gathered and organized, it can serve as an at-risk diagnostic and targeting training intervention tool for empowered teams. The integration of TPM concepts, such as autonomous responsibility, self-managed collaborative problem solving, and interpersonal skills training, along with the measurable outcomes of the trait profiles,provides an opportunity for perpetual enhancement of the teams.

VI. CONCLUSION

The findings of this study illustrate how personality traits impact the collaborative efficiency of marine biology teams. High levels of agreeableness and conscientiousness enhance harmony and productivity, while high levels of neuroticism dampen this synergy. The adaptation of TPM in research environments yields significant advancements in the interpersonal aspects and overall productivity of the teams. Explorations of team formations based on traits, AI-driven mapping of these traits, and longitudinal studies of the impacts of TPM-guided collaboration in non-marine science domains are open for future research.

REFERENCE

[1] Ali, H.A., & Farhan M.B. (2025). Bioremediation Techniques for Water and Soil Pollution: Review. Natural and Engineering Sciences, 10(1), 89-109. https://doi.org/10.28978/nesciences.1633049

[2] Krishnapriya, V., Nayak, G., Rengarajan, A., Ramakant., Nanda, S., Rohini, K., & Mohamed Jaffar, A. (2025). Evaluating the impact of marine protected areas on fisheries. International Journal of Aquatic Research and Environmental Studies, 5(1), 242–248. https://doi.org/10.70102/IJARES/V5I1/5-1-26

[3]Gadakh, R. B., &Shitole, V. (2025). The Effect of Team Interdependence on the Relationship Between Locus of Control and Work Performance in the Manufacturing Industry Around Pune. Indian Journal of Information Sources and Services, 15(2), 138–147. https://doi.org/10.51983/ijiss-2025.IJISS.15.2.19

[4] Marinković, G., Milutinović, T., & Božić, Marko. (2024). Identification and Analysis of Risks in Civil Engineering Projects. Archives for Technical Sciences, 1(30), 45-58. https://doi.org/10.59456/afts.2024.1630.045M

Puri, A., & Lakhwani, K. (2013). Enhanced approach for handwritten text recognition using neural network. International Journal of Communication and Computer Technologies, 1(2), 79-82. https://doi.org/10.31838/IJCCTS/01.02.02

[5] Salih, A. A. K., &Nangir, M. (2024). Design and Analysis of Wireless Power Transmission (2X1) MIMO Antenna at 5G - Frequencies for Applications of Rectenna Circuits in Biomedical. Journal of Wireless Mobile Networks, Ubiquitous Computing, and Dependable Applications, 15(3), 203-221. https://doi.org/10.58346/JOWUA.2024.I3.014

[6]Uvarajan, K. P. (2025). Integrating adapted yoga into sports-based occupational therapy for children with autism. *Journal of Yoga, Sports, and Health Sciences, 1*(1), 31–38.

[7]Khan, Z. (2024). *Design of smart wearable for cardiopulmonary monitoring with adaptive feedback loop*. Electronics, Communications, and Computing Summit, 2(4), 21–31.

[8]Mogoui, H. M. (2017). Comparison of personality traits and initial maladaptive schemas of addicts and non-addicts. *International Academic Journal of Innovative Research*, *4*(2), 74–79.

[9] Mohammadpour, B. (2018). Effect of human capital on strategic programs in learning organizations. *International Academic Journal of Organizational Behavior and Human Resource Management*, *5*(2), 70–78. https://doi.org/10.9756/IAJOBHRM/V5I2/1810015

[10] Fakhari, M. (2014). Relationship of Organizational culture, Teamwork and Job satisfaction in interprofessional teams. *International Academic Journal of Science and Engineering*, *1*(2), 36–44.

Ibrahim, N., Rajalakshmi, N. R., & Hammadeh, K. (2024). A Novel Machine Learning Model for Early Detection of Advanced Persistent Threats Utilizing Semi-Synthetic Network Traffic Data. Journal of VLSI Circuits and Systems, 6(2), 31–39. https://doi.org/10.31838/jvcs/06.02.04

[11] Kimeu, & Kioko, F. (2019). An Evaluation of the Role of Teamwork on Employee Performance at Machakos County Government, Kenya. *International Academic Journal of Social Sciences*, *6*(1), 81–87. https://doi.org/10.9756/IAJSS/V6I1/1910008

[12] Kaul, M., & Prasad, T. (2024). Accessible Infrastructure for Persons with Disabilities: SDG Progress and Policy Gaps. *International Journal of SDG's Prospects and Breakthroughs*, *2*(1), 1-3.

[13] Desai, P., & Joshi, V. (2023). Bridging Traditional and Modern Medical Terminologies Integrative Perspectives from Ayurveda and Allopathy. *Global Journal of Medical Terminology Research and Informatics*, *1*(1), 12-15.

Maidanov, K., & Fratlin, H. (2023). Antennas and propagation of waves connecting the world wirelessly. National Journal of Antennas and Propagation, 5(1), 1–5.

[14]Mansour, R. (2024). A Conceptual Framework for Team Personality Layout, Operational, and Visionary Management in Online Teams. *Global Perspectives in Management*, *2*(4), 1-7.

[15]Devi, R., & Priya, L. (2024). The Mechanism of Drug – Drug Interactions: A Systematic Review. *Clinical Journal for Medicine, Health and Pharmacy*, *2*(3), 32-41.