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Managing seafood processing in the value chain: A case study addressing skill gaps and enhancing labour responsibilities in Kerala, India

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Original Article

Abstract

Skills form the foundation of productivity and employability in industries, especially in dynamic sectors like seafood processing. As the seafood industry evolves with new technologies and rising global demand, bridging skill gaps becomes critical. This study investigates the skill gap in Kerala's seafood processing sector, focusing on the mismatch between existing and required employee skills. The research surveyed 323 employees' across upper, middle, and lower levels from processing units in Ernakulam and Alappuzha districts, selected through random sampling. Primary data were collected using structured questionnaires, face-to-face interviews, and direct observation, while secondary data were sourced from industry reports and scientific literature. Key soft skills assessed include adaptability, critical thinking, creative thinking, inter-personnel, listening, marketing management, self- management skills. A five-point Likert scale, ranging from "Satisfied" to "Needs Improvement," was used to evaluate the expected and perceived skill adequacy. Cronbach's Alpha tested the internal consistency of the questionnaire, while a t-test compared mean scores of expected and actual skills. The t-test yielded a significant result ($P < 0.05$), indicating a notable gap as employers' skill expectations exceeded employees' current capabilities. The findings underscore the urgent need for structured, professional training and development programmes to align workforce skills with industry demands, thereby enhancing competitiveness and contributing to India's economic growth.

Keywords: Skill gap, employability skill, seafood processing, skill development, human resource

Introduction

India is the world's second-largest fish producer, contributing

7.56% of global output and 1.24% of national GVA, with 7.28% from agriculture (Anon, 2022). In the fiscal year 2023-2024, India exported 17.81 lakh metric tons of seafood, valued at US\$ 7.38 billion, primarily to China and the USA. The sector is vital to India's economy, particularly in Kerala (Ancy and Raju, 2016). The country adopted modern fish processing in the 1960s (Amaravathi, 2019) and currently has 626 units with a combined capacity of 36,412.58 MT, including 388 EU-approved facilities. However, operations run at only 30-40% capacity due to skill shortages, inconsistent inputs, and management challenges (NABARD, 2018; Bokrantz *et al.*, 2020; Stavropoulos *et al.*, 2023). The widening "skill gap" is driven by economic and technological shifts (Braun *et al.*, 2022; McGuinness *et al.*, 2018) and demands continuous upskilling (Karacay, 2018; Clark, 2013; Wallin *et al.*, 2020). Measuring skills remains difficult due to a lack of standardized definitions and methodologies (Schwalje, 2012; OECD, 2017). Skill mismatches are often inconsistently addressed in academic and policy discourse (Brunello and Wruuck, 2021). Surveys and Likert scales suffer from bias and overlook informal learning (Morris *et al.*, 2020; Enders *et al.*, 2019). A skills-first approach shows promise but faces implementation hurdles (Pedota *et al.*, 2023).

Kerala has 118 seafood processing units 5,052.32 metric tonnes, including 100 EU-certified and 18 nationally certified units. Ensuring food safety through compliance with FSMS standards (GMP, GHP, SSOPs) and Codex guidelines is essential. SPS and TBT agreements (WTO) help harmonize global standards. Despite modernization, Kerala lacks comprehensive data on operations and workforce skills. Sathiadhas *et al.* (2012) highlighted the sector's economic

and employment contributions. This study addresses management practices and skill gaps in Kerala's seafood processing industry using a systematic narrative review (Turnbull *et al.*, 2023), aiming to inform targeted skill development and enhance industry competitiveness.

Material and methods

Seafood processing units established in the Alappuzha and Ernakulam districts of Kerala were subjected to statistical analysis to assess the skill level and skill gaps of employees working in the seafood processing industry. Personal interviews and direct observation methods were used to gather data on skill gaps in managerial and operational areas among the employees belonging to various cadres in the seafood industry.

Data source

The study utilized both primary and secondary data sources. The primary data were gathered through structured questionnaires administered to managers, supervisors, quality managers, processing workers, and cleaning staff in seafood exporting units within Kerala. Secondary data were obtained from a variety of published and unpublished sources, including reports from the Marine Products Export Development Authority (MPEDA), the Department of Fisheries, the Government of Kerala, the Seafood Exporters Association of India (SEAI), the Central Marine Fisheries Research Institute (CMFRI), and the Central Institute of Fisheries Technology (CIFT), along with relevant books, journals, websites, and newspaper articles.

Sampling method

This design involves random selection at both the cluster or group level and the individual sample unit level (Brown, 2010). The sample selection followed a multistage stratified random sampling approach. In the first stage, districts in Kerala with the highest concentration of seafood industries were selected. In the second stage, the number of seafood industry samples within each selected district was determined based on the industry's concentration. In the third stage, these samples were further categorized by their production in metric tonnes. In the fourth stage, the samples were divided according to the population working in each stage of the value chain within the seafood industry. Finally, samples from each stratum were randomly drawn. The population of the study consists of seafood exporters based in Ernakulam and Alappuzha, who are registered with the Marine Products Export Development Authority (Anon, 2019). The complete list of seafood processing exporters in these regions was obtained from the Directory of Registered Seafood Exporters, MPEDA 2019. According to the 2019 report by the

Marine Products Export Development Authority (MPEDA), the Kochi Regional Division includes 118 processing units with a total capacity of 5,052.32 metric tonnes. Of these, 100 units, with a combined capacity of 4,543.45 metric tonnes, are EU-approved plants selected for the study. Ernakulam and Alappuzha have been identified as major hubs of the seafood industry, collectively hosting 100 processing units.

Skill assessment

A standardized skill assessment scale was developed to ensure fair and objective evaluation of seafood freezing workers' skills. The scale design combined industry knowledge and insights from a detailed literature review. A discussion panel was formed including, supervisors, quality control personnel and human resource managers. The panel identified, defined, and finalized the essential skill attributes for each stage of the seafood freezing industry. After selecting the attributes, the panel designed the scoring system using the Likert Scale for structured numerical ratings. The data analysis was carried out on a five-point Likert-type scale ranging from strongly disagree, disagree, neutral, agree and strongly agree (Joshi *et al.*, 2015).

The study focused total population consisting of 17,100 workers employed across 100 seafood-freezing industries. To ensure the findings are representative of the population, a statistically sound sample size was determined (Singh and Musuku, 2014).

$$n = \frac{N \times z^2 \times p \times (1-p)}{e^2 \times (N-1) + z^2 \times p \times (1-p)} = 323 \text{ Employees}$$

Survey

A structured survey was conducted among seafood processing workers in Kerala, with district-wise respondent distribution highlighting industry concentration. Alappuzha (50.8%) and Ernakulam (33.9%) accounted for over 84% of participants, underlining their strategic importance in seafood processing. Kollam contributed 9.3%, while the remaining districts,

Table 1. District-wise distribution of respondents in the seafood processing industry

District	Frequency	Per cent	Valid per cent	Cumulative per cent
Alappuzha	60	50.8	50.8	50.8
Kochi	40	33.9	33.9	84.7
Kollam	11	9.3	9.3	96.6
Trivandrum	3	2.5	2.5	96.6
Palakkad	1	.8	.8	97.5
Kozhikode	1	.8	.8	98.3
Thrissur	2	1.7	1.7	100

Thrissur (1.7%), Palakkad (0.8%), Kozhikode (0.8%), and Trivandrum (2.5%), had minimal representation (Table 1).

Skill types assessed included technical (hard), interpersonal (soft), and analytical skills (Nasir *et al.*, 2011; Kapur, 2022; Rasheva, 2019). Employability and performance were linked to age, experience, and training, with experienced workers showing stronger problem-solving abilities. Performance appraisal and feedback, essential to aligning individual and organisational goals, were considered per Ramaprasad (1983).

Skill gap analysis, based on the difference between expected and perceived proficiency on a five-point Likert scale, focused on 12 core competencies including communication, adaptability, analytical, critical thinking, creative thinking, inter-personnel, leadership ability, teamwork management, marketing management, self-management. Independent variables included worker cadre (senior, intermediate, base) and education level. Supervisor ratings were used to enhance objectivity.

Skill gaps-defined as mismatches between job demands and employee capabilities analysed for their implications on productivity and training needs (McGuinness and Ortizskill, 2016; Antonucci and Ovidio, 2012). This approach enables targeted interventions to improve workforce capacity and address regional disparities in Kerala's seafood processing sector.

Results and discussion

Structure of the seafood industry

Seafood is a globally traded commodity, requiring stringent quality standards across the supply chain (Tavares *et al.*, 2021;



Fig. 1. Steps involved in seafood processing operations in a typical seafood processing industry

Hassoun *et al.*, 2022). Traditional preservation methods (drying, smoking, freezing) remain vital. Operational inefficiencies, poor hygiene, and lack of skilled labour compromise quality and safety, especially in cold storage and value addition. Handling, storage, and hygiene training remain inconsistent (Cappelli, 2015). Processing begins with raw fish from landing centres, then progresses to cleaning, cutting, and storage at -18 °C for exports. Processing units convert raw fish into frozen, canned, or value-added forms (Fig. 1). Byproducts (fishmeal, biofuel, omega-3s) help reduce waste. Third-party certifications and food safety frameworks improve sanitation and ethical practices.

Value chain and productivity constraints

Seafood value chains include inbound logistics, operations, marketing, and distribution (Harland, 1996; Porter, 1985). Kerala's major ports (*e.g.*, Neendakara, Munambam) handle >60% of raw seafood for processing, but suffer from cold-chain gaps and undertrained staff. Processing units-staffed predominantly by women (>75%), mostly uncertified-lack skilled manpower, causing quality losses (De Silva, 2011; Elavarasan, 2021). Value-added exports are limited due to shortages in technical and soft skills. Non-technical skills (communication, decision-making) are critical for maintaining quality standards (Staub, 1990). Technical and non-technical capabilities together determine production consistency (Fig. 2).

Human resources and skill composition

India's seafood sector employs millions but faces an acute



Fig 2. Steps in the value chain of the seafood processing industry

Table 2. Human resource distribution by education level and seafood processing industry

Total employment	Industry aggregate (% share) in top-level management	Industry aggregate (%share) in middle-level management	Industry aggregate (% share) in low-level management
Employee with a professional degree (food/ fish technology)	1.7%	34.69%	0%
I. post-graduates	25.1%	276%	0%
II. Graduates	70%	25.5%	2.2%
III. Diploma holders/certified courses	1.2%	17.4%	81.4%
IV. 10th standard or lower (those needing some sort of short-term, modular instruction, or skill-building)	1%	4.81%	92%

skill shortage (Behera and Gaur, 2022). Analysis shows that <20% of workers hold professional qualifications; diploma holders dominate low-level roles (81.4%) while postgraduates and professionals are underrepresented (Table 2). Most workers are female migrants, limiting access to training due to cultural and logistical barriers (ILO, 2006). Organisational productivity is directly impacted by this HR imbalance (Nordin *et al.*, 2013; Afroz *et al.*, 2018).

Skill gaps

Of the 323 surveyed employees, 86% confirmed skill deficits (Table 3). Cronbach's Alpha = 1.00 validated internal consistency (Table 4). A significant mismatch exists between expected and perceived skill levels across 12 skill areas (Table 5, 6, 7; Fig. 3). Notable gaps include problem-solving (1.27) and critical thinking. A t-test ($P = 2.20$) rejected the null hypothesis, confirming significant skill gaps, except for listening and communication (Armstrong and Taylor, 2006; Nadler, 1984).

Table 3. Sample size of the employees (positive and negative responses)

Worker response	Frequency	Percentage
Positive	278	86.0
Negative	45	13.9
Total	323	100

Table 4. Reliable Statistics of the questionnaire using Alpha Cronbach's method

Variables	Description	Values	Inter-consistency
Consistency K	No. of items	15	
$\sum s^2_y$	Sum of item variance	3.6	1.00
S^2_x	Variance of total score	6.64	
α	Cronbach's Alpha		

Table 5. Definition of employability skills (Abbasi *et al.*, 2018)

Skill	Definition
Communication	Includes both written and spoken communication
Adaptability	Being adaptable and able to constructively adjust to new circumstances, demands, and requirements
Analytical	The capacity to compile and analyse information, create and test solutions to issues, and make plans
Creative thinking	A method of viewing an issue or circumstance from a novel angle that proposes alternative answers
Critical thinking	Using sound logic, standards, ideas, and definitions to investigate certain concerns or questions
Interpersonal	having the ability to get along well, cooperate, empathise, and work well with people from different backgrounds
Leadership ability	To inspire and mentor other workers and help them succeed
Listening	Focused concentration that recognises important details
Problem-solving	Combining your knowledge and abilities to achieve successful results
Teamwork management	The capacity of a person or organisation to manage and direct a team of people to complete a task
Marketing management	The process of organising and carrying out the creation, costing, marketing, and distribution of concepts, products, and services
Self-management	Assuming accountability, being adaptable, enhancing one's own performance, and time management

Table 6. Range of the mean and SD of the expected and possessed skills in the seafood processing industry

Skill Type	Perceived skills		Expected skills	
	Mean	SD	Mean	SD
Listening	3.11	0.49	3.81	0.75
Interpersonal	2.66	0.35	3.79	0.71
Communication	2.91	0.40	3.78	0.71
Self-management	2.48	0.30	3.74	0.70
Problem solving	2.46	0.25	3.73	0.70
Adaptability	2.98	0.44	3.71	0.69
Analytical	3.03	0.45	3.65	0.68
Marketing management	2.9	0.42	3.61	0.66
Leadership ability	2.51	0.32	3.57	0.66
Teamwork management	2.51	0.31	3.54	0.65
Creative thinking	2.68	0.35	3.47	0.63
Critical thinking	2.62	0.33	3.45	0.62

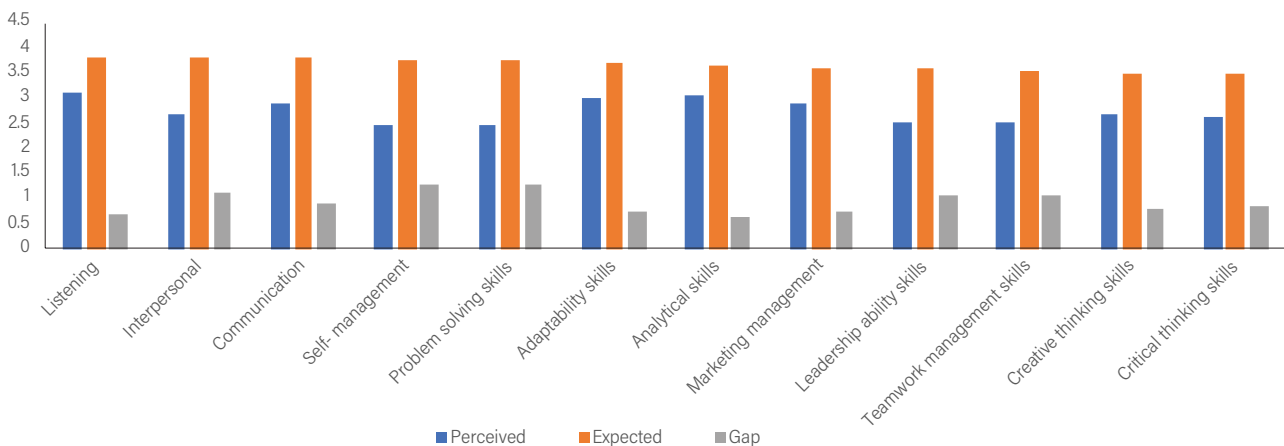


Fig. 3. Skill gap analysis between perceived and expected competencies among employees in the seafood processing industry

Table 7. Expected ranks vs. perceived ranks of skills among the employees in the seafood processing industry

Skills	Perceived ranks		Expected ranks	
	mean	Rank	mean	Rank
Listening	3.11	1	3.81	1
Interpersonal	2.66	7	3.79	2
Communication	2.91	5	3.78	3
Self-management	2.48	11	3.74	4
Problem-solving skills	2.46	12	3.73	5
Adaptability skills	2.98	3	3.71	6
Analytical skills	3.03	2	3.65	7
Marketing management	2.9	4	3.61	8
Leadership ability skills	2.51	9	3.57	9
Teamwork management skills	2.51	10	3.54	10
Creative thinking skills	2.68	6	3.47	11
Critical thinking skills	2.62	8	3.45	12

Skill enhancement needs

Globally, 80% of the Indian workforce lacks marketable skills (Saini, 2015; Sonali and Sakshi, 2015). In seafood, a lack of trained personnel impacts safety, quality, and capacity utilisation (Ganguly *et al.*, 2019; Kirkley *et al.*, 2002). Programs like KSDM and ITIs can bridge skill gaps through contextual, multilingual micro-certifications. SEAL partnerships and mandatory certifications are needed to align with global standards (Richardson, 2007; Balasubramaniam *et al.*, 2012; Sajesh *et al.*, 2021). Localised, inclusive training for Kerala's women-led, migrant-dependent workforce is essential for scaling productivity and meeting export demands.

Conclusion

A significant skill gap persists in Kerala's seafood industry, particularly among women and migrant workers, due to mismatches between workforce demographics and traditional training methods. Over 80% of female workers lacked formal training in hygiene and equipment use. The results revealed demographic-linked performance gaps, highlighting the need for mobile, multilingual, and context-specific training. Bridging this gap requires localised skilling through ITIs, workplace mentoring, and alignment of policy with industry needs to ensure sustainable, inclusive workforce development.

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Author contributions

Conceptualisation: RKN; Methodology: RKN; Data Collection: RKN; Data Analysis: RKN, SAV; Writing Original Draft: RKN; Writing Review and Editing: SAV; Supervision: SAV

Data availability

The data are available and can be requested from the corresponding author.

Conflict of interests

The authors declare that they have no conflict of financial or non-financial interests that could have influenced the outcome or interpretation of the results.

Ethical statement

The research was carried out following ethical guidelines for academic research. Participants were fully informed about the nature and purpose of the study, and their consent was obtained before data collection.

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References

- Abbasi, F. K., A. Ali and N. Bibi. 2018. Analysis of skill gap for business graduates: managerial perspective from banking industry. *Education+ Training*, 60 (4): 354-367.
- Afroz, N. N. 2018. Effects of training on employee performance-A study on banking sector, Tangail Bangladesh. *Glob. J. Econ. Bus.*, 4 (1): 111-124.
- Amaravathi, T., P. Parimalam and A. K. Ganguli. 2019. Work Environment of Seafood Industry. *Environ. We Int. J. Sci. Tech.*, 8 (2013): 81-85.
- Ancy, V. P. and K. V. Raju. 2016. Trends in Marine Products Exports from India: Issues and Challenges, *International Journal of Research in Finance and Marketing*, 6 (3): 100-112.
- Anon. 2019. *Ensuring sustained quality seafood by redefining the export potential of India*. Marine Products Export Development Authority (MPEDA), Ministry of Commerce and Industry, Government of India, 292 pp https://mpeda.gov.in/wp-content/uploads/2020/07/MPEDA_RTI_Manual_Final_3122019.pdf
- Anon. 2022. *International collective in support of fish workers*. Marine Products Export Development Authority (MPEDA). Retrieved from https://www.business-standard.com/article/news-cm/india-smarine-product-exports-hit-in-fy-2021-2011-122062901070_1.html
- Antonucci, L. and F. D. d'Ovidio. 2012. An informative system based on the skill gap analysis to planning training courses. *Appl. Math.*, 3: 1619-1626.
- Armstrong, M. and S. Taylor. 2006. *Human resource management practice*. Distributed Computing (10th ed.). Kogan Page Publishing, London, 957 pp.
- Balasubramaniam, S., J. C. Jeeva and S. Ashaletha. 2012. Adoption of quality management practices in seafood processing sector in Cochin region. *Fish. Technol.*, 49 (1): 80-86.
- Behera, B. and M. Gaur. 2022. Skill Development Training Fueling Employability in India. *Journal of Xidian University*, 16 (2): 332-347.
- Bokrantz, J., A. Skoogh, C. Berlin, T. Wuest and J. Stahre. 2020. Smart Maintenance: an empirically grounded conceptualization. *Int. J. Prod. Econ.*, 223: 107534.
- Braun, G., M. Järvinen, J. Stahre and R. Hämäläinen. 2022. Motivational challenges of engineers participating in an online upskilling program. In *European Conference on E-Learning*. Academic Conferences International Limited. p. 25-31.
- Brown, R. S. 2010. 'Sampling', in *International Encyclopedia of Education*. Elsevier, p. 142-146.
- Brunello, G. and P. Wruuck. 2021. Skill shortages and skill mismatch: A review of the literature. *J. Econ. Surv.*, 35 (4): 1145-1167.
- Cappelli, P. H. 2015. Skill gaps, skill shortages, and skill mismatches: Evidence and arguments for the United States. *ILR Review*, 68 (2): 251-290.
- Clark, H. 2013. A comprehensive framework for measuring skills gaps and determining work readiness. *Employment Relations Today*, 40 (3): 1-11.

- De Silva, D. A. M. 2011. Value chain of fish and fishery products: origin, functions and application in developed and developing country markets. *Food and Agriculture Organization*. 63: 1-53.
- Elavarasan, K. 2021. Surimi and other mince based fishery products. ICAR-Central Institute of Fisheries Technology. 2 (4): 1088-1100.
- Enders, T., V. Hediger, S. Hieronimus, J. W. Kirchherr, J. Klier, J. Schubert and M. Winde. 2019. Future skills: six approaches to close the skill gap. *World Government Summit*. p. 1-16.
- Ganguly, K., G. Ashok and J. V. Braun. 2019. Skill Development in Indian Agriculture and Food Processing Sectors: A Scoping Exercise, ZEF Working Paper Series, 183: 48 pp.
- Harland, C. M. 1996. Supply chain management, purchasing and supply management, logistics, vertical integration, materials management and supply chain dynamics. *Blackwell Encyclopedic Dictionary of Operations Management*. UK: Blackwell. 15 pp.
- Hassoun, A., S. A. Siddiqui, S. Smaoui, I. Ucak, R. N. Arshad, O. Garcia, P. Miguel, A. Prieto, A. Ait-Kaddour, R. Perestrelo, J. S. Câmara and G. Bono. 2022. Seafood processing, preservation, and analytical techniques in the age of industry 4.0. *Applied Sciences*, 12 (3): 1703.
- Joshi, A., S. Kale, S. Chandel and D. K. Pal. 2015. Likert scale: Explored and explained. *British Journal of Applied Science and Technology*, 7 (4): 396-403.
- Kapur, R. 2022. Understanding the significance of Analytical skills within the organisations. <https://www.researchgate.net/publication/357928311>
- Karacay, G., A. Ustundag and E. Cevikcan. 2018. Talent development for Industry 4.0. *Industry 4.0: Managing the digital transformation*, p. 123-136.
- Kirkley, J., C. J. Morrison Paul and D. Squires. 2002. Capacity and capacity utilization in common-pool resource industries. *Environmental and Resource Economics*, 22 (1): 71-97.
- McGuinness, S. and L. Ortiz. 2016. Skill gaps in the workplace: measurement, determinants and impacts. *Ind. Relat. J.*, 47 (3): 253-278.
- McGuinness, S., K. Pouliakas and P. Redmond. 2018. Skills mismatch: Concepts, measurement and policy approaches. *J. Econ. Surv.*, 32 (4): 985-1015.
- Morris, D., E. Vanino and C. Corradini. 2020. Effect of regional skill gaps and skill shortages on firm productivity. *Environment and Planning A: Economy and Space*, 52 (5): 933-952.
- NABARD. 2018. Sect oral paper on fisheries and aquaculture, Farm Sector Policy Department NABARD, Mumbai. <https://www.nabard.org/auth/writereaddata/file/Fisheries%20and%20Aquaculture.pdf>
- Nadler, L. 1984. The Handbook of Human Resource Development. New York: John Wiley & Sons. <https://www.scribbr.com/reference/101313>
- Nasir, A. N. M., D. F. Ali, M. K. B. Noordin and M. S. B. Nordin. 2011. Technical skills and non-technical skills: predefinition concept. In *Proceedings of the IETEC'11 Conference, Kuala Lumpur, Malaysia* p. 1-7.
- Nordin, M. S., A. N. M. Nasir, M. K. Noordin and Y. Buntat. 2013. Gap of proficiency for skilled workers and employer needs towards Non-technical Skills for electronic sector in Klang Valley, Malaysia. *Procedia Soc. Behav. Sci.*, 93: 1473-1477.
- OECD (Organisation for Economic Co-operation and Development). 2017. *Skills for Jobs Indicators*. OECD Publishing. <http://dx.doi.org/10.1787/9789264277878-en>
- Pedota, M., L. Grilli and L. Piscitello. 2023. Technology adoption and upskilling in the wake of Industry 4.0. *Technological Forecasting and Social Change*, 187: 122085.
- Porter, M. E. 1985. *The Competitive Advantage: Creating and sustaining superior performance*. Free Press New York, 557 pp.
- Ramaprasad, A. 1983. On the definition of feedback. *Behav. Sci.*, 28 (1): 4-13.
- Rasheva, Y. K., E. Iliev and B. Nikolova. 2018. Analytical Thinking as a key Competence for Overcoming the Data Science Divide. In *Proceedings of EDULEARN18 Conference*, p. 2-4.
- Richardson, S. 2007. *What Is a Skill Shortage?*. National Centre for Vocational Education Research Ltd. PO Box 8288, Stational Arcade, Adelaide, SA 5000, Australia. p. 15-18.
- Saini, V. 2015. Skill development in India: Need, challenges and ways forward. *Abhinav National Monthly Refereed Journal of Research in Arts and Education*, 4 (4): 1-9.
- Sajesh, V. K., A. Suresh, A. K. Mohanty, V. Singh and C. N. Ravishankar. 2021. Skill development in marine fisheries: Some reflections on the issues and way outs. *Indian J. Anim. Sci.*, 91 (7): 518-524.
- Sathiadhas, R., R. Narayanakumar and N. Aswathy. 2012. *Marine fish marketing in India*. CMFRI Kochi. p. 19-21.
- Schwalje, W. 2012. Rethinking how establishment skills surveys can more effectively identify workforce skills gaps. MPRA Paper 37192, University Library of Munich, Germany, https://mpra.ub.uni-muenchen.de/37192/1/MPRA_paper_37192.pdf
- Singh, A. S. and M. B. Masuku. 2014. Sampling techniques & determination of sample size in applied statistics research: An overview. *International Journal of economics, commerce and management*, 2 (11): 1-22.
- Sonali, K. and V. Sakshi. 2015. Skill development initiatives and strategies, *Asian J. Manag. Res.*, 5 (4): 666-672.
- Stavropoulos, P., P. Fotinopoulos, J. Stavridis and H. Bikas. 2023. Increasing the industrial uptake of additive manufacturing processes: A training framework. *Advances in Industrial and Manufacturing Engineering*, 6, 100110. <https://doi.org/10.1016/j.aime.2022.100110>
- Tavares, J., A. Martins, L. G. Fidalgo, V. Lima, R. A. Amaral, C. A. Pinto and J. A. Saraiva. 2021. Fresh fish degradation and advances in preservation using physical emerging technologies. *Foods*, 10 (4): 780.
- Turnbull, D., R. Chugh and J. Luck. 2023. Systematic-narrative hybrid literature review: A strategy for integrating a concise methodology into a manuscript. *Social Sciences and Humanities Open*, 7 (1): 100381.
- Wallin, A., L. Pylväs and P. Nokelainen. 2020. Government workers' stories about professional development in a digitalized working life. *Vocations and Learning*, 13 (3): 439-458.