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ORIGINAL

Challenges encountered by cashew nut processing industry

Desafíos a los que se enfrenta la industria de transformación del anacardo

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ABSTRACT

Tamandu has emerged as one of India's premier cashew nut producers and processors. The thriving export potential and robust local demand have fueled the rapid expansion of the cashew industry in this region. With approximately 675 cashew nut processing units scattered across Tamil Nadu, these establishments have primarily embraced labor-intensive operations, offering valuable employment opportunities to rural communities. However, it's worth noting that only 576 processing units have managed to contribute data for this study. The collected data predominantly revolves around challenges related to various facets of cashew nut processing, including activity-based challenges, issues concerning workers' families, social problems, worker hygiene challenges, hurdles encountered within the processing units, as well as difficulties tied to workers' wages and benefits. Furthermore, the investigation into occupational health, ergonomic considerations, and the development of ergonomically designed work equipment in small and medium-scale cashew nut processing units in Tamil Nadu has remained largely unexplored. As a result, this research seeks to shed light on the risk of musculoskeletal issues prevalent in these cashew processing units, aiming to address an important aspect of workers' well-being in this vital industry.

Keywords: Cashew Nut; Processing Unit; Marketing; Challenges in Processing Units; Processing Units Workers.

RESUMEN

Tamandu se ha convertido en uno de los principales productores y procesadores de anacardos de la India. El floreciente potencial exportador y la fuerte demanda local han impulsado la rápida expansión de la industria del anacardo en esta región. Con unas 675 unidades de procesamiento de anacardos repartidas por todo Tamil Nadu, estos establecimientos han optado principalmente por operaciones intensivas en mano de obra, ofreciendo valiosas oportunidades de empleo a las comunidades rurales. Sin embargo, cabe señalar que sólo 576 unidades de procesamiento han logrado aportar datos para este estudio. Los datos recogidos giran principalmente en torno a los retos relacionados con diversas facetas de la transformación del anacardo, incluidos los retos basados en la actividad, las cuestiones relativas a las familias de los trabajadores, los problemas sociales, los retos de higiene de los trabajadores, los obstáculos encontrados dentro de las unidades de transformación,

así como las dificultades relacionadas con los salarios y las prestaciones de los trabajadores. Además, la investigación sobre la salud laboral, las consideraciones ergonómicas y el desarrollo de equipos de trabajo diseñados ergonómicamente en unidades de procesamiento de anacardos a pequeña y mediana escala en Tamil Nadu ha permanecido en gran medida inexplorada. Como resultado, esta investigación pretende arrojar luz sobre el riesgo de problemas musculoesqueléticos que prevalecen en estas unidades de procesamiento de anacardos, con el objetivo de abordar un aspecto importante del bienestar de los trabajadores en esta industria vital.

Palabras clave: Anacardo; Unidad De Transformación; Comercialización; Desafíos en las Unidades de Transformación; Trabajadores de las Unidades de transformación.

INTRODUCTION

Cashew cultivation predominantly thrives in the coastal regions of both the western and eastern parts of India, as well as in select areas of Karnataka and Madhya Pradesh. Remarkably, manual processing remains the dominant method, with only two mechanized processing facilities reported. Cashew nuts hold a significant position in the world of dried fruits and have been integral to various culinary creations for an extended period. The journey of a cashew begins with the plucking of raw nuts from the cashew plants, followed by meticulous processing to extract the kernels, which are the sought-after table variety. Cashews are a premium dried fruit, commanding a high retail price. To maintain their quality and freshness, it is crucial to process them properly, as their shelf life ranges from 4 to 6 months; improper processing may lead to fungal growth or a bitter taste. These versatile nuts find their way into numerous sweet preparations, certain savory snacks, and even ice creams. Additionally, they serve as premium table condiments in exclusive restaurants and luxury hotels. The market demand for cashews is steadily growing, while the supply remains limited. Raw cashew nuts are a seasonal commodity, with trading typically occurring from March to May. Growers typically channel their produce to local or village markets, where small traders gather them for distribution in urban centers. The cashew trade is often intertwined with other plantation products, with traders engaged in multiple agricultural goods. The competitive nature of the cashew trade minimizes marketing issues for growers. When middlemen amass substantial quantities, processors join the supply chain and engage in bulk purchases. Remarkably, India has yet to establish official grades and standards for cashews. Generally, quality assessment is reliant on visual appearance and sensory evaluations, conducted by traders prior to acquisition.

Cashew nut processing unit background

The cashew processing industry in India has witnessed significant growth over the past half-century. In its initial stages, this industry was predominantly situated in Kerala, which accounted for more than 50 percent of the country's cashew plantations. However, as land ceiling legislation restricted further cashew cultivation in Kerala, the demand for cashew nuts continued to rise. Consequently, cashew cultivation expanded to other coastal states in India, particularly in the Sindhudurg district of Maharashtra. Several other states also embraced cashew cultivation and processing. Notably, the comparatively high GST of 12,5 percent in Kerala played a role in propelling the growth of the cashew industry in other states, where GST rates ranged from 2 to 4 percent. The number of cashew processing units in the country experienced a rapid increase, surging from 170 in 1959 to a substantial 3,650 by 2020–21, the last year for which official government data is available. During this period, the total processing capacity in India amounted to 15 lakh tonnes of raw nuts, with an average capacity utilization rate of 75 percent. Maharashtra led the way with 2,200 units, followed by Kerala with 432 units, and Tamil Nadu with 417 units. Notably, nearly 84 percent of the processing units in Maharashtra

operated within the small-scale cottage sector. It is estimated that currently, India hosts approximately 4,000 cashew processing units, boasting an installed capacity of roughly 18 lakh tonnes. Assuming a 75 percent capacity utilization rate, akin to that observed in 2020–2021, it suggests that around 14 lakh tonnes of cashews in their shells are currently being processed in the country. Roughly half of this processing capacity is met through domestic supplies, while the industry relies on imports to meet the remaining demand.

Previous Approaches

Many researchers from India as well as from abroad have designed and developed a good number of cashew nut shellers so far.

Somyot & Sermpol[1] (1985) constructed a centrifugal cashew nut sheller to break cashew nut using optimum kinetic energy. It consists of a rotating shaft with a centrifugal disk, feeder, sheller bin, and discharger. The shaft, which is placed vertically at the center of sheller, is rotated by the electric motor. The cashew nuts fed from the top-feeder passes through the centrifugal disks. Due to centrifugal force, the fed cashew nut impacts the casing of sheller bin. The performance of centrifugal sheller was evaluated at 800 rpm, 900 rpm, 1000 rpm, and 1100 rpm. The shelling efficiency was 51,3 % to 58,3 % for cashew nuts above 7 g weight and 21,8 % to 25,9 % for cashew nuts below 7 g weight. The shelling capacity of this sheller was found to be 200 kg per hour. Thivavarnvongs, Okamoto, & Kitani [2](1995) designed two types of manualcashew nut sheller models (AE (KKU) 1 and AE (KKU) 2), and one semi-automated sheller model (AE (KKU) SA 1). The working principle of both manual shellers was based on press-twist movement of hand lever. In AE (KKU) SA 1, the cashew nut feeding is manual, and shelling is automatic. Thivavarnvongs, Sakai, & Kitani (1995) evaluated manual and semi-automated shellers. They reported that The AE (KKU) 2 was easy to operate and had a whole kernel recovery of 79,3 %, whereas automatic model (AE (KKU) SA 1) had a whole kernel recovery of 80,0 %. Jain & Kumar[3](1997) developed a power-operated cashew nut sheller. It consists of different sections for feeding, shelling, discharge, power supply, and transmission. The sheller mainly consists of two round wooden disks of 25 mm thickness. One disk is fixed to the sidewall of the sheller, and the other disk is a spring-loaded rotating one. The cashew nuts that are fed into the sheller are compressed and subjected to shearing by rotation of disk. The shelled nuts are collected at the discharge section. Bulaong, Gregorio, & Jallorina[4] (2000) designed an automated cashew nut sheller. It consists of two blades (upper blade and lower blade) with a contour shape ofcashew nut. Using micro switch, the lower blade is penetrated into cashew nut up to desired thickness, and the upper blade is twisted to shear the cashew nut. In this process, one nut is shelled at a time. Ojolo & Ogunsina[5] (2007) designed a box-type cashew nut shelling machine. It consists of a hinge and a spring-loaded cracking lid. The cashew nuts are placed in the round grooves and pressed gently using the spring-loaded lid. At a time, 25 roasted cashew nuts can be cracked using this box-type sheller. Fu et al.[6] (2016) developed an automated cashew nut sheller. It consists of adaptive cashew nut shelling cutters, a support frame cutter, and a scraper. Thecashew nut is placed on a V-shaped groove, and the scraper is used to drag the cashewnut against adaptive cutters. Particularly, the spring-loaded upper blade can move up and down in order to accommodate the size variance of cashew nuts. Kilanko et al.[7] (2019) designed a shelling machine using the impact method. The sheller was evaluated using three different sized nuts (small, medium, large) and three levels of impeller speeds. The results showed that the large-sized nuts exhibited higher whole kernel recovery (82,0 %) compared to small and medium nuts.

This section provides an overview of various research efforts focused on the challenges within cashew nut processing units. While numerous studies have examined aspects such as worker productivity, efficiency, whole kernel recovery, and the overall performance of these processing units, it is noteworthy that there is a notable gap in research pertaining to the ergonomic design of processing units and the occupational health of workers.

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Research questions

The researcher aims to address the following research questions:

1. Are there any work environment challenges encountered by cashew nut processing units?
2. What strategies are employed to address family and social challenges within cashew nut processing units?
3. How do processing units overcome challenges inherent to their operations?
4. Do the wages and other benefits provided to workers in the study area meet their satisfaction?

Objectives of this study

The research objectives are as follows:

1. Investigate the work-related challenges encountered by laborers in the cashew nut production industry.
2. Examine the family and social challenges experienced by workers within cashew nut processing units in the study area.
3. Analyze any challenges confronted by the processing units operating in the study area.
4. Identify issues related to workers' wages and benefits within the processing units in the study area.

METHODS

This article is based solely on primary data collected through structured interviews. According to data records from cashew nut processing and sales mandis, there are a total of 675 processing units scattered across Tamil Nadu. The questionnaire used in this study is categorized into six distinct sections, covering a range of topics, including challenges related to work activities, family-related challenges faced by workers, social problems encountered, issues pertaining to worker hygiene, challenges within the processing units themselves, and difficulties concerning workers' wages and benefits. The detailed questionnaire was meticulously prepared and administered directly by the researcher in the field. Out of the 675 processing units, data was successfully collected from 576 units using a census method. The collected data was then organized and tabulated using JMP software, which facilitated the creation of tables and appropriate charts to visualize the findings. Frequency data was transformed into percentages using JMP and is presented in tables throughout the study

RESULT

Challenges faced by the Cashew nut processing units

The issue plaguing cashew nut processing units revolves around individuals who consistently engage in behaviors that are detrimental both to their own interests and to the organization they are affiliated with. These problems experienced by employees have the potential to erode their morale, thereby impacting their overall job performance. The various categories of problems faced by individuals, particularly workers and administrative staff, are elaborated upon below:

Activity based challenges related to works

Physiological problems, also known as physical issues, encompass various illnesses or discomforts that disrupt an individual's daily routines. These problems manifest as physical sensations, including body pain, leg pain, stomach ache, headaches, eye pain, throat discomfort, earaches, and other discomforts that create unpleasant sensations, ultimately making the affected individuals feel as though their physical well-being is compromised. It's important to note that transport workers such as drivers and conductors, as well as workshop staff and administrative personnel engaged in desk-based tasks, often experience physical pains and psychological disturbances while carrying out their duties. Therefore, this study has identified and cataloged the variables associated with the specific pains

endured by transport employees. These variables are systematically presented in Table 1 for a comprehensive examination and understanding of the physical challenges faced by individuals in these occupational roles.

Table 1. Activity based challenges related to works

S. No.	Variables	HA	A	N	NA	HNA	Mean
1.	Skin having & itching	39,58	46,88	8,68	4,34	0,52	4,21
2.	Skin having & itching	20,83	55,03	21,70	1,74	0,69	3,94
3.	Back pain	27,43	51,39	15,28	5,38	0,52	4,00
4.	Cough and piles	22,05	48,96	18,75	6,77	3,47	3,79
5.	Wounds & Asthma	24,31	47,22	15,28	10,24	2,95	3,80
6.	Headache	22,92	50,69	16,32	6,25	3,82	3,83
7.	Iye and site problem	28,30	51,04	12,33	5,73	2,60	3,97

Source: Primary
HA: Highly Agree, A- Agree, N- Natural, NA- Not Agree, HNA – Highly Not agree

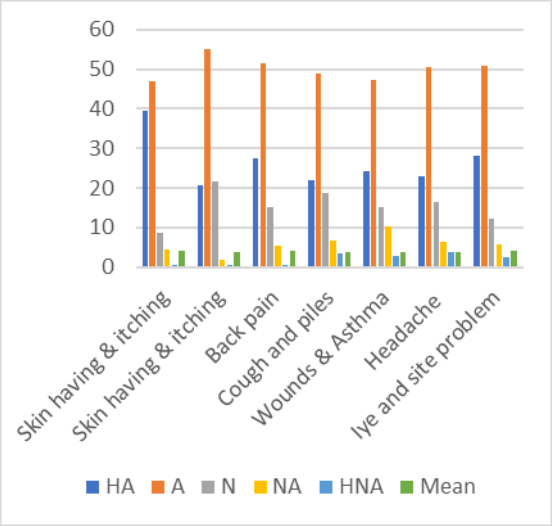

Figure 1. Activity based challenges related to works

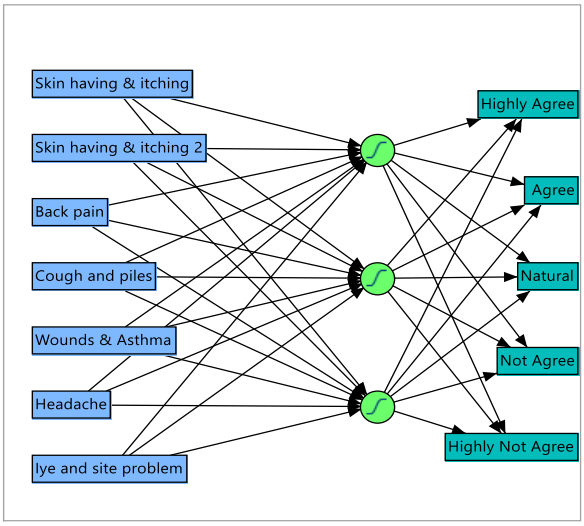

Figure 2. Activity based challenges related to works

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The findings derived from Table 1 reveal important insights regarding the experiences of the sample respondents. It is notable that a substantial proportion of the respondents, specifically 46,88 percent, acknowledge experiencing skin irritation and itching while on duty at certain times. Additionally, 55,03 percent of the respondents concur with the occurrence of skin irritation and itching after completing their work tasks. A significant portion, accounting for 51,39 percent, agrees that they suffer from back pain due to prolonged periods of sitting and standing at their workplace. Furthermore, 48,96 percent of the respondents admit to encountering issues such as coughing and piles due to overwork or double duty, while 47,22 percent have concurred that wounds and asthma can be attributed to consuming contaminated food during their duty hours. Also, 50,69 percent of the respondents agree that they frequently experience headaches when dealing with irate coworkers, and 51,04 percent concur that eye and sight problems arise due to the extensive use of their eyes in their line of work. Examining the mean scores, it is evident that the highest level of agreement, with a mean score of 4,21, pertains to individuals experiencing skin irritation and itching during their duties. Following closely, with a mean score of 4,00, is the acceptance of skin irritation and itching resulting from contact with cashews. The progressive diminution of cough and piles due to heavy pollution receives an acceptance score of 3,97, and experiencing back pain and body heat after working hours garners an acceptance score of 3,94. Additionally, the occurrence of headaches when dealing with coworkers is accepted at a mean score of 3,83. On the lower end of the spectrum, respondents assign a lower acceptance score of 3,80 to experiencing wounds and asthma due to contamination, and an acceptance score of 3,79 for facing eye and sight problems as a result of overwork or double duty. In summation, the data suggests that a significant number of respondents within the study group commonly encounter problems related to back pain and body heat after work, with body and leg pain during duty hours being particularly prevalent among employees in the private bus transport sector in Mayiladuthurai district.

Workers Family and social challenges

Psychological problems encompass the realm of extreme stress and mental depression experienced by individuals. In the context of employees, such issues often arise when their efforts and contributions go unrecognized by their employers. This study delves into the various variables associated with psychological problems, including but not limited to stress, anxiety, depression, distress, and inferiority complex. The objective is to analyze these psychological challenges experienced by transport employees, and the outcomes of this analysis are thoughtfully presented in Table 2 for comprehensive understanding and examination.

Table 2. Workers Family and Social challenges

S. No.	Variables	HA	A	N	NA	HNA	Mean
1.	Family support	25,87	45,66	16,67	7,64	4,17	3,81
2.	Multi responsibility	21,53	48,96	15,63	9,03	4,86	3,73
3.	Lack of leisure	29,34	41,32	14,41	10,07	4,86	3,80
4.	Illness of family	26,91	42,71	21,53	7,47	1,39	3,86
5.	Lack of social contact	20,14	43,40	24,65	7,47	4,34	3,68
6.	Lack of equality	23,26	36,98	23,78	10,24	5,73	3,62
7.	Social recognition	22,74	46,88	17,53	6,77	6,08	3,73
8.	Lack of government support	23,78	46,53	19,62	5,38	4,69	3,79
9.	Natural disorders	26,39	40,10	22,22	8,16	3,13	3,78

Source: Primary

HA: Highly Agree, A- Agree, N- Natural, NA- Not Agree, HNA – Highly Not agree

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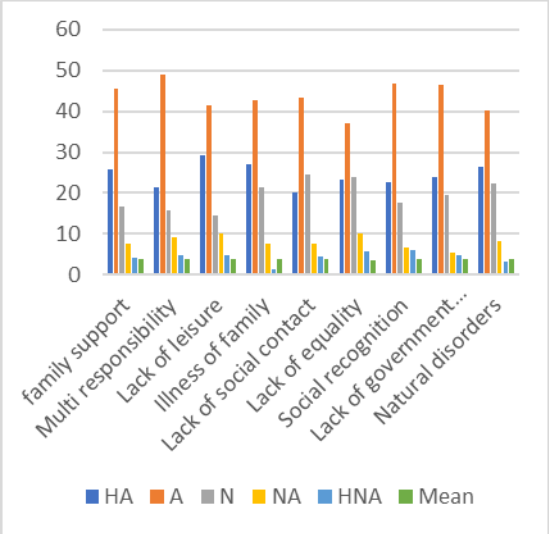

Figure 3. Workers Family and Social challenges

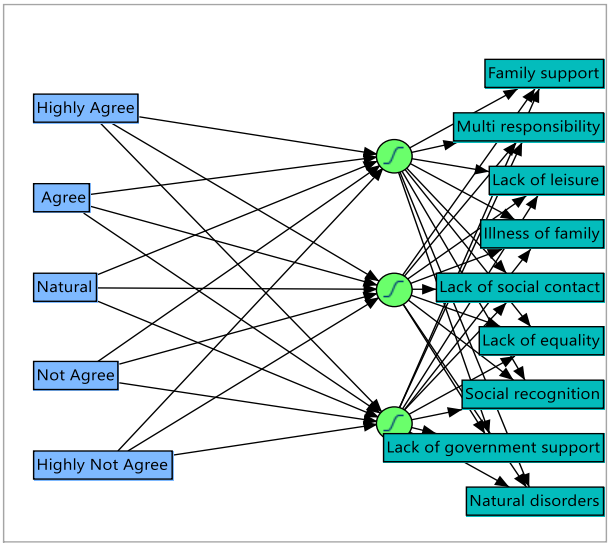

Figure 4. Workers Family and Social challenges

The insights gleaned from Table 2, derived from a sample of 576 respondents, reveal significant information about the psychological challenges faced by these individuals. Notably, 45,66 percent of the respondents acknowledge experiencing stress primarily due to the instability of job tenures. Additionally, 48,96 percent express anxiety regarding the future well-being of their families. A substantial 41,32 percent admit to feeling depressed when their exceptional job performance remains unrecognized by their employers. Moreover, 42,71 percent report experiencing mental anguish when passengers engage in unruly behavior. Nearly 43,40 percent concur with feelings of demoralization when they are assigned repetitive tasks, and 36,98 percent express distress concerning the inadequacy of the terminal benefit scheme. Furthermore, 46,88 percent agree that their job focus is negatively impacted by overwork and the absence of colleagues due to leave. A significant proportion, 46,53 percent, indicates feelings of inferiority when comparing their well-being measures to those enjoyed by counterparts in the public sector transport system. Lastly, 40,10 percent admit to a compulsive urge to rest during their off-duty hours, driven by extreme tiredness. The mean scores provide further insights, indicating the highest level of acceptance, with a mean score of 3,86, is associated with the experience

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of mental anguish when passengers quarrel and misbehave. In contrast, the lowest level of acceptance pertains to the feeling of demoralization resulting from repetitive work tasks. In conclusion, it can be deduced that a significant number of transport employees face challenges related to anxiety about their families' future in case of illness and distress stemming from the absence of a comprehensive terminal benefit scheme. These findings shed light on the psychological strains experienced by employees in the transport sector.

Challenges in processing units

Employees within transport companies encounter common issues that, while not part of their daily routine, are experienced periodically. This study aims to analyze the variables identified concerning these recurrent workplace challenges faced by employees. The findings and insights from this analysis are thoughtfully presented in Table 3 for a comprehensive understanding and examination of the subject matter.

Table 3. Challenges in processing units

S. No.	Variables	HA	A	N	NA	HNA	Mean
1.	More power cut	31,60	41,15	18,23	7,81	1,22	3,94
2.	Interruption in process	27,60	41,15	22,05	7,29	1,91	3,85
3.	Lack of output	26,56	35,59	17,19	16,32	4,34	3,64
4.	Lack of quality	22,57	44,62	16,84	9,55	6,42	3,67
5.	Untimely supply	26,39	34,38	22,22	12,50	4,51	3,66
6.	Inadequate supply	20,31	46,53	22,05	8,51	2,60	3,73
7.	Damage	24,48	42,71	19,79	9,20	3,82	3,75
8.	Time consuming process	22,40	46,70	14,76	6,42	9,72	3,66
9.	Space availability	25,87	40,63	13,72	8,16	11,63	3,61

Source: Primary
HA: Highly Agree, A- Agree, N- Natural, NA- Not Agree, HNA - Highly Not agree

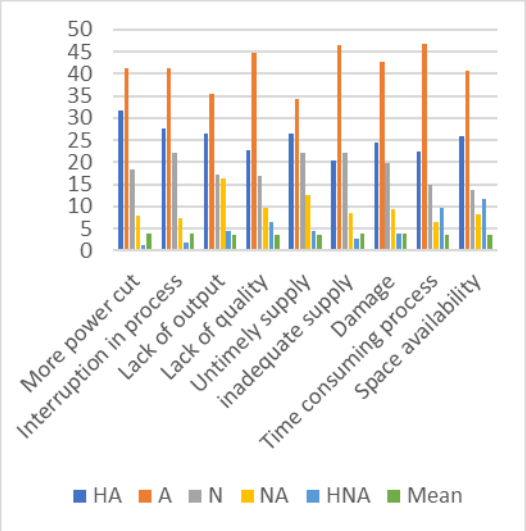

Figure 5. Challenges in processing units

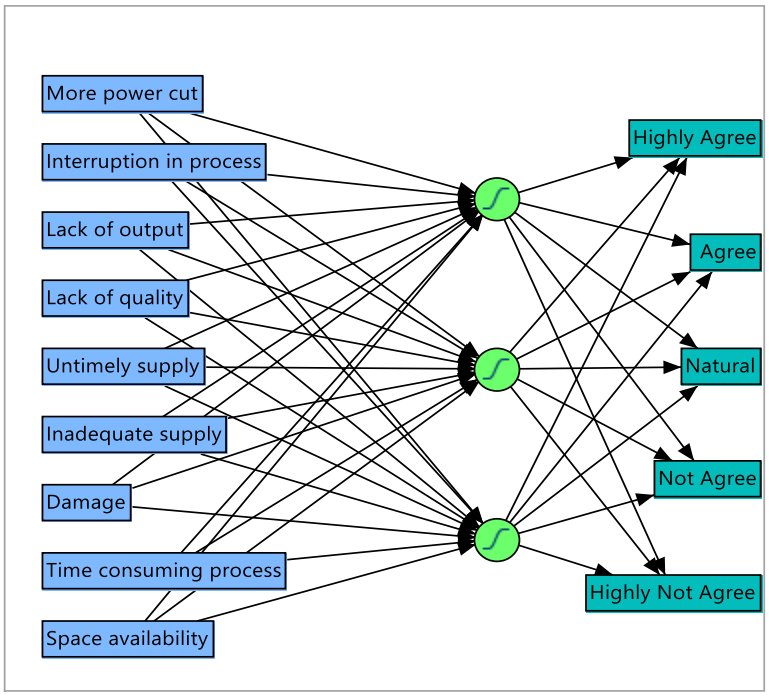

Figure 6. Challenges in processing units

The analysis of Table 3, which is based on responses from 576 participants, reveals valuable insights into the common challenges faced by employees in the workplace. Notably, 41,15 percent of the respondents affirm that they receive adequate support from their employers when they suffer injuries or illnesses. Additionally, a substantial 35,59 percent concur that their companies genuinely display interest in resolving their personal issues. Furthermore, 44,62 percent acknowledge instances of poor supervision and inadequate training, while 34,38 percent admit to experiencing significant stress due to overwork or double duty. A noteworthy 46,53 percent agree that they face both physical and mental health issues due to deception. Moreover, 42,71 percent express awareness of the risky nature of their job but feel compelled to continue due to a lack of alternatives. A substantial 46,70 percent indicate that they grapple with mental stress in meeting monthly targets related to collection, fuel economy, and cost reduction. Lastly, 40,63 percent acknowledge feeling tied to their companies due to challenging family circumstances. The mean scores provide additional insights, highlighting that the highest level of acceptance, with a mean score of 3,94, pertains to employees receiving proper support from their employers when dealing with injuries or illnesses. Following closely, with a mean score of 3,85, is the acceptance of the company's sincere interest in resolving personal issues. A mean score of 3,75 indicates that employees are acutely aware of the risky nature of their job but continue due to a lack of alternative opportunities. Conversely, the lowest levels of acceptance, with mean scores of 3,67 and 3,66, correspond to employees experiencing work pressure when management demands additional duties without breaks and feeling that they receive inadequate supervision and training at times, respectively. In summary, the analysis suggests that employees experience mental stress in meeting monthly performance targets, but they also receive substantial support from their employers when facing injuries or illnesses. These findings underscore the multifaceted challenges faced by employees within the workplace.

Challenges in workers' wages and benefit

Table 4 presents stress as the primary factor influencing employee performance.

Table 4. Challenges in workers' wages and benefit

S. No.	Variables	HA	A	N	NA	HNA	Mean
1.	Insufficient labour	23,44	43,92	16,49	7,99	8,16	3,66
2.	Wages challenges	12,33	50,69	23,96	5,56	7,47	3,55
3.	Are they accepting time or piece rate system	28,99	40,63	16,84	10,76	2,78	3,82
4.	Advance payment	16,32	44,27	25,87	7,64	5,90	3,57
5.	Extra benefit	18,92	43,23	25,00	7,12	5,73	3,63

Source: Primary
HA: Highly Agree, A- Agree, N- Natural, NA- Not Agree, HNA - Highly Not agree

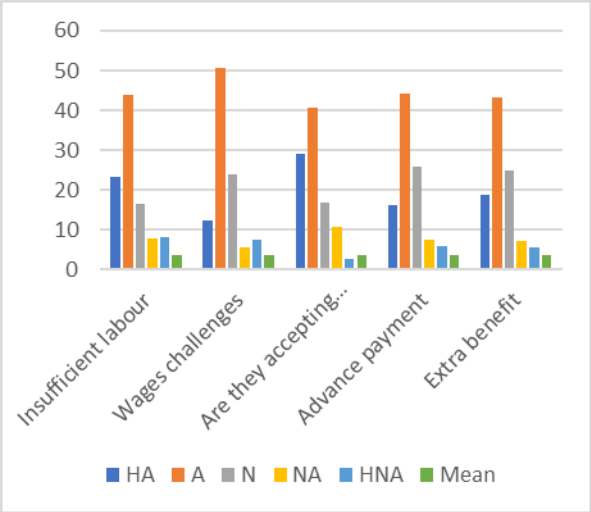

Figure 7. Challenges in workers' wages and benefit

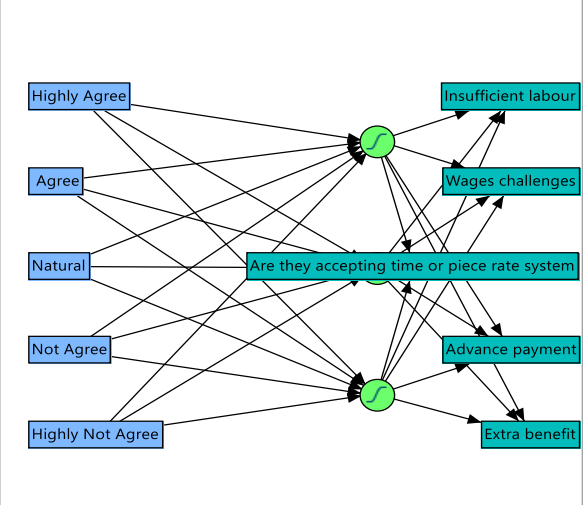

Figure 8. Challenges in workers' wages and benefit

Table 4, based on responses from 576 participants, sheds light on stress as a critical factor impacting employee performance. Notably, 43,92 percent of respondents acknowledge experiencing mental stress when they violate transport rules. A significant 50,69 percent concur that they feel disheartened when their discretionary efforts go unrecognized by their employer. Additionally, 40,63 percent admit to experiencing stress when struggling to maintain a balance between work and home life. Further, 44,27 percent acknowledge enduring high levels of stress when their bosses reprimand them for

underperformance, and 43,23 percent report feeling mentally harassed when their transfer requests are denied. The mean scores offer deeper insights, highlighting that the highest level of acceptance, with a mean score of 3,82, relates to employees experiencing stress when they find it challenging to balance their work life with their home life. Following closely, with a mean score of 3,66, is the acceptance of experiencing mental stress when transport rules are violated. A mean score of 3,63 signifies that employees feel mentally harassed when their transfer requests are turned down. Conversely, the lowest levels of acceptance, with a mean score of 3,55, are associated with employees feeling disheartened when their discretionary efforts are not adequately acknowledged by their employer. In summary, the analysis indicates that employees grapple with feelings of disappointment when their discretionary efforts are not recognized by their employer and also experience stress when trying to balance the demands of their work life and home life. These findings underscore the significance of acknowledging and addressing stress-related factors in the workplace for improved employee performance.

CONCLUSION

In conclusion, Tamandu's cashew nut processing industry in India is undergoing substantial growth, driven by strong export potential and local demand. With around 675 cashew nut processing units dispersed across Tamil Nadu, this sector plays a vital role in providing valuable employment opportunities to rural communities. Nonetheless, it's noteworthy that data collection was accomplished from only 576 of these processing units, emphasizing the need for a more comprehensive understanding of the challenges confronting the industry. The identified challenges span a broad spectrum, encompassing issues related to work activities, workers' family dynamics, social concerns, worker hygiene, processing unit operations, and workers' compensation and benefits. Addressing these challenges effectively is paramount to ensuring the sustained progress and prosperity of the cashew nut processing industry. Moreover, this research underscores a critical research gap concerning occupational health and the ergonomic aspects of work equipment design within small and medium-scale cashew nut processing units in Tamil Nadu. This gap underscores the importance of conducting further research in these domains to enhance worker well-being, safety, and efficiency. One particularly concerning aspect highlighted in this study is the risk of musculoskeletal disorders faced by workers in cashew nut processing units. This finding underscores the urgency of implementing ergonomic improvements and measures to reduce the likelihood of work-related injuries and health problems. To foster the sustainable growth of Tamandu's cashew nut processing industry, it is imperative for various stakeholders, including governmental bodies, industry leaders, and researchers, to collaborate effectively and comprehensively address the challenges that have been identified. By prioritizing improved working conditions, the implementation of ergonomic solutions, and a focus on workers' health and welfare, the industry can thrive while concurrently safeguarding the well-being of its labor force. This approach will not only bolster the industry's economic contributions but also contribute to the broader social and economic development of the region.

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CONFLICT OF INTEREST

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