

CHIANG MAI FOOD INDUSTRY CO. LTD. (Thailand)



ABOUT THE COMPANY

Chiang Mai Food Industry Co. Ltd. is a medium scale cannery operation located in Chiang Mai, Thailand. It has about 300 employees. The company's cannery factory shares an eight hectare site with a dried fruit factory. The canning factory has a total floor area of 8,250 square meters and employs 23 permanent staff and about 300-2,000 temporary staff depending on the season. Its main products are longans, lychees, mushrooms and bamboo shoots. The factory produces between 50,000 and 100,000 cans of these products a day and sells them to both the local and international market.

WHY GP?

ENVIRONMENTAL IMPROVEMENT

Environmental issues are one of the major obstacles limiting the development of the food processing industry in Thailand. Factories in this sector generally consume a lot of water and produce large quantities of solid waste and high-strength waste water. Strict effluent regulations are now putting pressure on manufacturers to improve their environmental performance. In response, many companies have either installed expensive end-of-pipe pollution treatment technology or else they dump their wastes into the environment with inadequate treatment. Knowledge of waste reduction is limited.

Even before they implemented GP, the management of Chiang Mai Food Industry was aware of the limitations of end-of-pipe waste treatment and the burdens that this approach can place on a business. By implementing GP, the company hoped to resolve the pollution issues associated with its lychee and mushroom canning lines in a cost-effective way. As an industry leader, it also aimed to be a demonstration model for the rest of the cannery sector in the country.

To implement GP, the company used the methodology described in the introductory chapter.



MAIN ISSUES

WASTE SOURCES AND CAUSES

The review of both the lychee and mushroom processing and canning lines involved a number of different procedures. These included water and waste water monitoring using Ishikawa cause and effect analysis (see Fig. 2), a material balance analysis and eco-mapping (see Fig. 3). These investigations allowed the GP team to get a clear picture of how raw materials were used and wastes produced. It was found that the main problem in both processes was excessive waste water generation. Solid waste generation due to spoilage and process waste was also a key pollution problem.

Lychee processing was found to generate high-concentration waste water. This was due to the acid discharge from lychee soaking at the beginning of the production process and syrup spillage during canning. Washing water also added to the pollution load. Altogether about 320 m³/day of waste water was produced.

The costs of these waste water streams were calculated and it was found that: acid waste cost about 140 Baht per cubic meter (US\$ 3.5 per cubic meter); waste water from washing cost 25 Baht per cubic meter (US\$ 0.6 per cubic meter); and spillage from syrup cost 171 Baht per cubic meter (US\$ 4.2 per cubic meter).

Mushroom processing created many different waste water streams from both the mushroom washing section and from the production line. These included waste water with high BOD content and brine with a high chloride content. A lot of leakage and spillage was observed. All together between 189 and 235 m³/day of waste water was produced, costing about 10 Baht per cubic meter (US\$ 0.2 per cubic meter).

The main causes of water use and wastage were analyzed using a fish-bone diagram (See Fig. 2). Key problems were:

- Cleaning was inefficient because raw materials were too dirty, there were no spray guns or floor washing machines and workers used only open hoses.
- Acid was discharged after lychees had been soaked only one time and was not re-used.
- The perforated pipe used for lychee washing was not water-use efficient.
- The can washing machine was not being operated properly and was wasting water.
- No recycling facilities existed for cooling water.
- Workers had no awareness of waste minimization issues due to a lack of training.

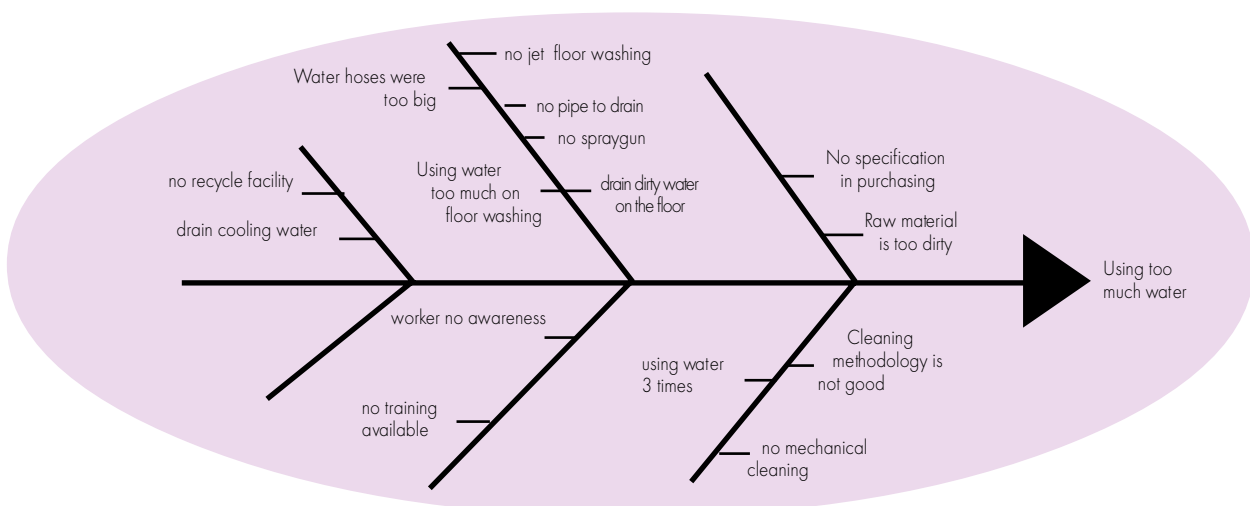
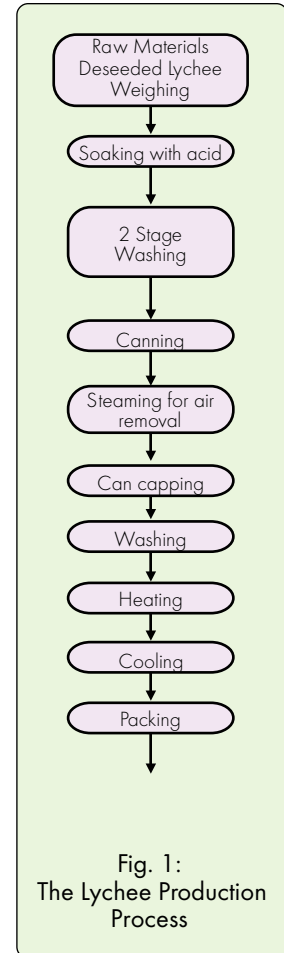


Fig.2: Ishikawa Fish-bone Diagram Showing Main Causes of Water Wastage

GP SOLUTIONS/IMPLEMENTATION

Once the main production problems had been assessed, the GP team identified and analyzed possible improvement options. For the lychee production line these involved changes in the production process and alterations to the machinery. These options were then assessed in terms of their technical and financial feasibility. A number of them, such as the implementation of vacuum capping to reduce wastewater dripping — which cost 2 million Baht (US\$ 49,440) — and the purchase of floor washing machines, were deemed to be too expensive. However the following GP options were implemented:

- The lychee soaking process was changed so that citric acid was used twice. In this way acid waste was reduced by a half, which resulted in savings of about 2,307 Baht/day (US\$ 57/day). This improvement did not carry any additional costs.
- The lychee washing process was improved by the installation of shower head sprays. This cost 5,000 Baht (US\$ 123), saved 20 m³ of water a day and saved 500 Baht/day (US\$ 12). (Payback period ten days).
- A syrup collection system was installed which reduced syrup loss by at least 70%. This led to a cost saving of 500 Baht/day (US\$ 12.3/day). The system cost 20,000 Baht (US\$ 494) which translates into a payback period of under 17 days.
- The operation of the can washing machine was improved, leakages were fixed and more efficient water hoses installed.

Ten improvements were suggested for the mushroom production line. These included specification changes and the introduction of mechanical cleaning and water recycling.

After evaluation, it was found that all options were potentially profitable with payback periods of less than 16 months. For example, simple changes such as reducing the amount of soil farmers were allowed to leave on the mushrooms they delivered would reduce water costs by between 13,950 and 52,320 Baht/day (US\$ 345 and 1,293/day).

Of the technical options, it was found that the most immediately effective measure would be to change water hoses to a smaller size and add a spray gun. This would save 15 m³/day and give cost savings of about 242 Baht/day (US\$ 6/day) (equivalent to a 12.6 day pay back period).

Unfortunately due to problems relating to raw material supply, the company was not able to implement the mushroom processing improvement options.

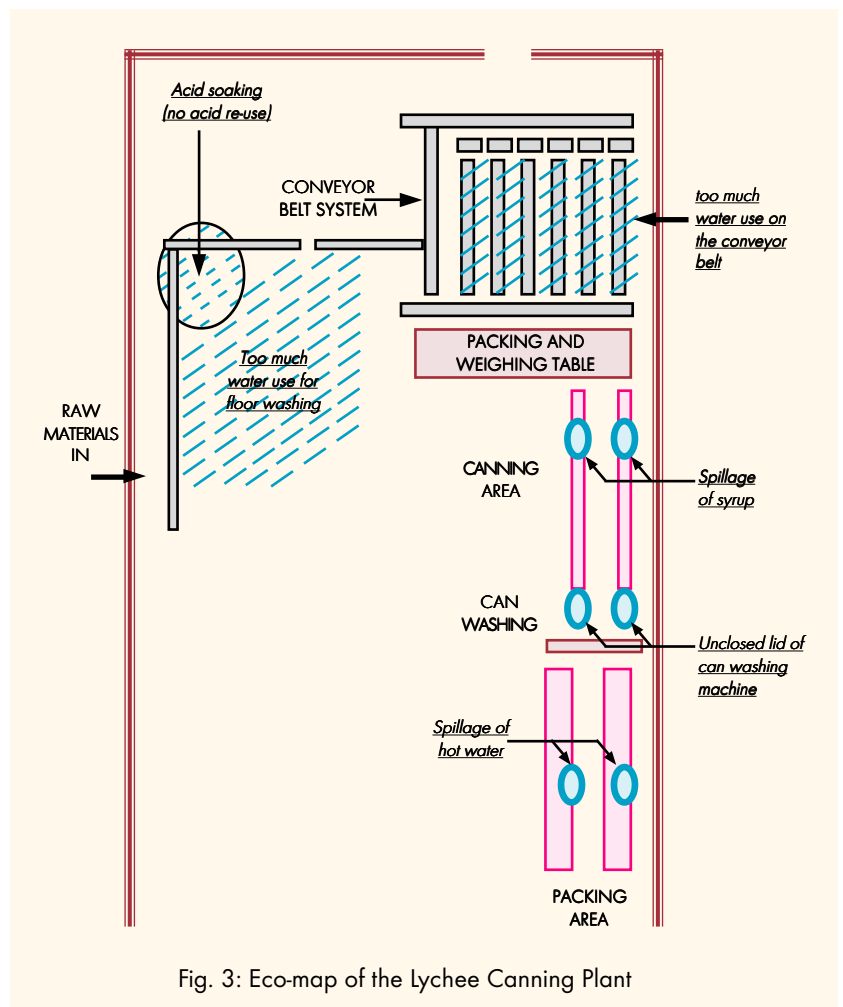


Fig. 3: Eco-map of the Lychee Canning Plant



BENEFITS OF GP

ENVIRONMENTAL IMPROVEMENTS

The implementation of GP in the lychee processing line at Chiang Mai Food Industry resulted in significant specific cost savings and reductions in the amount of waste water produced as detailed above. Overall, the total amount of waste water generated by the process was reduced by 45%. The results also showed that the factory saved up to 30% of the chemicals used in the process.

ECONOMIC SAVINGS

Based on the assumption of an average production of 25 tons/day and a production period of 90 days per season, it was calculated that the total saving from the implementation of GP options in lychee plant would be about 280,898 Baht/season (US\$ 6,943/season). With a total investment of 75,000 Baht (US\$ 1,854), this translates into a payback of much less than one season.

CONCLUSION

The GP demonstration project at Chiang Mai Food Industries shows that the same systematic analysis method can be applied to two different production processes to yield significant environmental improvements and profit gains.

The project's significance to the food processing industry in Thailand and other developing countries is potentially massive, since it shows that cost effective solutions exist to the industry's main problem, namely waste water generation. It is now expected that more factories and other industrial sectors will realize the effectiveness of GP practices as a result of Chiang Mai Food Industry's work.

“By adopting GP methodology, Chiang Mai Food Industry Co Ltd is able to save substantially by minimising citric acid and other resource usage and also on waste water treatment costs.

We expect more companies in Thailand to adopt this GP methodology and gain similar benefits.”

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Video available for this case study from:

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