RIU

Weighing up costs and benefits in fish factories

Validated RNRRS Output.

Simple software helps managers in fish factories in developing countries record and analyse data. Collecting data is the first step towards weighing up costs and benefits. Using ice, disinfecting machinery and constructing better containers all cost money. The software helps managers decide the most cost-effective ways to improve production. Tested in Uganda and Ghana, the software has helped cost the benefits of using ice, and provides information for a booklet on sanitation in factories and for designing fish containers and holds. A prototype hold improved returns by at least 15%. Use of the software is spreading to Pakistan and Morocco, and there is already interest in Namibia, Denmark and India.

Project Ref: **PHF13:**
Topic: **7. Spreading the Word: Knowledge Management & Dissemination**
Lead Organisation: **The Grimsby Institute of Higher & Further Education, UK**
Source: **Post Harvest Fisheries Programme**

Document Contents:

Description, Validation, Current Situation, Current Promotion, Impacts On Poverty, Environmental Impact,

Description

PHF13

Research into Use
NR International
Park House
Bradbourne Lane
Aylesford
Kent
ME20 6SN
UK

Geographical regions included:

Ghana, Pakistan, Uganda,

Target Audiences for this content:

Fishers, Processors, Consumers,

A.   Description of the research output(s)

1. Working title of output or cluster of outputs.
In addition, you are free to suggest a shorter more imaginative working title/acronym of 20 words or less.

   Cleanse-IT, Ice-IT and Log-IT

2. Name of relevant RNRRS Programme(s) commissioning supporting research and also indicate other funding sources, if applicable.

   Post Harvest Fisheries Research Programme

3. Provide relevant R numbers (and/or programme development/dissemination reference numbers covering supporting research) along with the institutional partners (with individual contact persons (if appropriate)) involved in the project activities. As with the question above, this is primarily to allow for the legacy of the RNRRS to be acknowledged during the RIUP activities.

   R6959 / R5027 / R6817 R7008
   Main contact – Dr Mike Dillon, Manufacturing Improvement International Ltd (formerly Mike Dillon Associates Ltd), Unit 20, Business Science Park, Nuns Corner, Grimsby, N E Lincolnshire, DN34 5FQ, Tel. 01472 277007

4. Describe the RNRRS output or cluster of outputs being proposed and when was it produced? (max. 400 words). This requires a clear and concise description of the output(s) and the problem the output(s) aimed to address. Please incorporate and highlight (in bold) key words that would/could be used to select your output when held in a database.

   The main part of this project work has focused on investigating and **costing control measures** from 1998 - 2000. Quantitative and qualitative survey methods were developed and used with the subsequent production of a considerable amount of technical and economic data. This enabled **modelling** of the cost of intervention to provide advisory agencies, industry and government policy makers with a tool to allow a prediction, at the macro and micro- level, of cost interventions in the chain.

   The project therefore developed methods to identify, document and cost appropriate **control methods within the fisheries chain**. The first phase of the project was planned to investigate, **document and cost sanitation control systems** in fish processing plants in Uganda. Previous work had been completed in this area and the related loss prediction area by NRI under project no. R5027. This project built on the losses work, which demonstrated a need for effective control systems. The economic engineering team based at FAO in the Department for Fisheries had also completed significant investigations over 20 years and collaborated with the project team (Lupin et al Technical Manual 351).

   The icing work in Uganda and Ghana continued to promote the use of cost-effective practices.

Software tools were developed to manage and capture information from the **icing trials** and cost the benefits.

The Ugandan team completed the documentation of the **factory cleaning controls** and published a booklet to support industry in building better controls.
The project aimed to assist to resolve the problem of losses of fish and **fish quality** in **Ghana** and **Uganda**. This was shown to directly benefit the fisherfolk and the processors through better yields, so making better usage of resources available. FAO had estimated that a significant shortfall (19 million tonnes) in fish protein by the millennium, with low income groups facing the severest deficit.

Software Sanitation Control - **Cleanse -IT**
Documentation and cost estimation of cleaning systems.
Validation and monitoring of factory based cleaning systems.

Icing Trials Database - **Ice-IT**
Data collection, reporting, and modelling of quality improvement
Container construction, prediction and validation of melting rates

Ice Calculator - Ice-IT
Optimisation of ice usage and container design

Electronic Diary- **Log-IT**
Capture and recording of key information by factory.
Also used to feed other software tools and improve estimation/ prediction.

5. What is the type of output(s) being described here?
Please tick one or more of the following options.

Product	Technology	Service	Process or Methodology	Policy	Other Please specify
	X		X		

6. What is the main commodity (ies) upon which the output(s) focussed? Could this output be applied to other commodities, if so, please comment

These outputs were developed for the fisheries sector, but some of the tools could be applied to different food sectors. The outputs on cleaning methods and costing systems could be used in any food-manufacturing factory.

7. What production system(s) does/could the output(s) focus upon?
Please tick one or more of the following options. Leave blank if not applicable

Semi-Arid	High potential	Hillsides	Forest-Agriculture	Peri-urban	Land water	Tropical moist forest	Cross-cutting

8. What farming system(s) does the output(s) focus upon? Please tick one or more of the following options (see Annex B for definitions).
Leave blank if not applicable

Smallholder rainfed humid	Irrigated	Wetland rice based	Smallholder rainfed highland	Smallholder rainfed dry/ cold	Dualistic	Coastal artisanal fishing
						x

*9. How could value be added to the output or additional constraints faced by poor people addressed by clustering this output with research outputs from other sources (RNRRS and non RNRRS)? (**max. 300 words**).*

Please specify what other outputs your output(s) could be clustered. At this point you should make reference to the circulated list of RNRRS outputs for which proformas are currently being prepared.

Three outputs are clustered within this report -

Validation

B.   Validation of the research output(s)

*10. **How** were the output(s) validated and **who** validated them?*

*Please provide brief description of method(s) used and consider application, replication, adaptation and/or adoption in the context of any partner organisation and user groups involved. In addressing the "who" component detail which group(s) did the validation e.g. end users, intermediary organisation, government department, aid organisation, private company etc… This section should also be used to detail, if applicable, to which social group, gender, income category the validation was applied and any increases in productivity observed during validation (**max. 500 words**).*

The economic engineering team based at FAO in the Department for Fisheries assisted in the design and testing of the models and the validation of the field -work. Protocols were developed and published with the software, so that the methodologies could be replicated.

The project outputs provided the participating factories with formally documented cleaning controls and a cost estimate for their revised cleaning programme. The advisory service (NARO) have

designed procedures for validation of cleaning controls and produced a national guidance document on best practice for food factory cleaning.

The modified Ugandan icing and sanitation controls have been evaluated by the EU and found to meet their international export requirements thus enabling re-entry into the market. The handling, icing and cleaning controls were reported to have significantly improved since 1997.

The Ghanaian team leader visited Uganda to review the approach in 1999. The approach to auditing factory-cleaning control was then successfully undertaken and tested at Divine Seafood in Ghana. The existing protocols for undertaking technical audit, trials and cost calculations were repeated and modified. The Ghanaian team focused on the icing work, which had begun in Uganda. They then reviewed the existing controls present in their fisheries chain and selected handling, better insulation, and improved icing as a focus of their intervention work.

11. **Where and when** have the output(s) been validated?

Please indicate the places(s) and country(ies), any particular social group targeted and also indicate in which production system and farming system, using the options provided in questions 7 and 8 respectively, above **(max 300 words)**.

Full-scale sea trials in Ghana and the installation of software in three operational factories in Uganda provided positive feedback. Further factories in Uganda have requested software tools and fishermen in Ghana are now asking for lined holds. Subsequent trials have been designed to offer the level of validation necessary for technical publication. This trial data and other feedback from users has therefore enabled the final refinement of the software products to be undertaken prior to the closing meeting which took place in Ghana in September 2000.

The prototype hold was found to be subject to rusting and the metal lining became separated from the wooden base. The next version was of a better construction and has been welcomed by the local fishermen. The economic benefits of the lined holds has been demonstrated in trials with gains of at least 15% being recorded (Akrofi and Sanchez, 2000)[5]. The Ghana team also documented the controls in fish handling and icing activities through an extensive technical survey executed throughout Ghana based on the Uganda approach.

This project was linked through associated research to other activities. The Director of Fish Inspection (Tangiers) has been closely involved in the approach and has employed the tools and techniques to significant effect in Morocco. The methodology has also been demonstrated to target groups in 1998 (Namibia), 1999 (Denmark) and 2000 (Ghana, India) at a series of practical workshops.

Current Situation

C.   Current situation

*12. **How and by whom** are the outputs currently being used? Please give a brief description **(max. 250 words**).*

The Ice-IT software is currently being used to analyse the fisheries sector and value added in Pakistan. Problems with IT infrastructure have meant that the IT tools are no longer being used in Uganda and Ghana.

*13. **Where** are the outputs currently being used? As with Question 11 please indicate place(s) and countries where the outputs are being used **(max. 250 words).***

The Ice-IT software is currently being used to analyse the fisheries sector and value added in Pakistan. Problems with IT infrastructure have meant that the IT tools are no longer being used in Uganda and Ghana.

*14. What is the scale of current use? Indicating how quickly use was established and whether usage is still spreading **(max 250 words).***

Current use of the IT tools is very low, and as far as is known the usage did not spread any further than the initial project scope. The use of ice for preserving fish however, has increased, but studies have not been conducted to asses this.

*15. In your experience what programmes, platforms, policy, institutional structures exist that have assisted with the promotion and/or adoption of the output(s) proposed here and in terms of capacity strengthening what do you see as the key facts of success? **(max 350 words).***

N/A – There has not been a adoption of the IT Tools.

Current Promotion

D.   Current promotion/uptake pathways

*16**. Where** is promotion currently taking place? Please indicate for each country specified detail what promotion is taking place, by whom and indicate the scale of current promotion **(max 200 words).***

The IT tools are currently being promoted on a small scale by Grimsby Instutute of Further and Higher Education who are working with the fisheries sector in Thailand.

*17. What are the current barriers preventing or slowing the adoption of the output(s)? Cover here institutional issues, those relating to policy, marketing, infrastructure, social exclusion etc. **(max 200***

words).

The outputs of these projects was a group of IT tools, and so consequently access to IT equipment and its reliability is a major barrier.

*18. What changes are needed to remove/reduce these barriers to adoption? This section could be used to identify perceived capacity related issues **(max 200 words).***

Greater access to and reliability of IT systems.

*19. What lessons have you learnt about the best ways to get the outputs used by the largest number of poor people? **(max 300 words).***

Impacts On Poverty

E.   Impacts on poverty to date

20. Where have impact studies on poverty in relation to this output or cluster of outputs taken place? This should include any formal poverty impact studies (and it is appreciated that these will not be commonplace) and any less formal studies including any poverty mapping-type or monitoring work which allow for some analysis on impact on poverty to be made. Details of any cost-benefit analyses may also be detailed at this point. Please list studies here.

No formal poverty impact studies have been undertaken in connection with this project.

*21. Based on the evidence in the studies listed above, for each country detail how the poor have benefited from the application and/or adoption of the output(s) **(max. 500 words):***

- *What positive impacts on livelihoods have been recorded and over what time period have these impacts been observed? These impacts should be recorded against the capital assets (human, social, natural, physical and, financial) of the livelihoods framework;*
- *For whom i.e. which type of person (gender, poverty group (see glossary for definitions) has there been a positive impact;*
- *Indicate the number of people who have realised a positive impact on their livelihood;*
- *Using whatever appropriate indicator was used detail what was the average percentage increase recorded*

At the outset of the project, average reject rates recorded at Ugandan landing sites were between 9 to 12% for Nile Perch. The adoption of icing and better handling practices in earlier stages of the chain has subsequently reduced this reject rate to below 5% and often nearer 3%. A 9% increase in quality material for export on the annual 100,000 ton fishery industry added $2.7 million dollars to the country revenue with fish valued at $3/kilo.

The cost impact of the closure of the fisheries in 1998 (Bagumuire 2000) was estimated to be $30 million per annum. The export association (UFPEA) reported a major impact on the fisheries livelihoods of 500,000 dependants throughout the chain as fish prices were reduced by 70% when fishery was denied access to major market. The re-opening of the market was based upon demonstratable effective control within the primary and factory segments of the chain, which were supported by this project and recognised by the sector. Factory gate prices have now been seen to rise by 50% as the market has re-opened

The usefulness of the approach is demonstrated by the application of the tools in further projects supported by UNIDO and incorporated into the policy and planning process in country e.g. the Ugandan 5 year medium term research plan.

The work in Ghana resulted in economic gains for the fishermen, fishing mummies and the captains as the quality was seen to rise.

In India, what was more important was that participants in the workshop were exposed to issues concerning the use of ice in post-harvest contexts. This had increased awareness amongst Fisheries Development Officers who attended the workshop and that this awareness had been fed into the fishing villages. The result was the rapid adoption of ice and ice-boxes to preserve fish on land and at sea. Indeed, some of those present went so far as to claim that the workshop had been instrumental in the shift towards the use of ice in Tamil Nadu fisheries. The result, it was reported, was a rapid increase in the demand for ice-boxes which at present the Directorate of Fisheries can not meet. It is presently seeking funds to subsidise distribution of ice-boxes.

Environmental Impact

H.   Environmental impact

24. What are the direct and indirect environmental benefits related to the output(s) and their outcome (s)? **(max 300 words)**

This could include direct benefits from the application of the technology or policy action with local governments or multinational agencies to create environmentally sound policies or programmes. Any supporting and appropriate evidence can be provided in the form of an annex.

None

25. Are there any adverse environmental impacts related to the output(s) and their outcome(s)? **(max 100 words)**

None

26. Do the outputs increase the capacity of poor people to cope with the effects of climate change, reduce the risks of natural disasters and increase their resilience? **(max 200 words)**

No