JIFSAN’s Training programs and Approach to Monitoring Impact

Clare Narrod and Tarik Chfadi, JIFSAN, University of Maryland
### Why is Training Needed?

<table>
<thead>
<tr>
<th>Reasons</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>❖ Demand for food has changed</td>
<td>❖ Seafood:</td>
</tr>
<tr>
<td>▪ “Seasonal foods” all year</td>
<td>▪ 86% of the shrimp, salmon, tilapia and other fish and shellfish comes from other countries</td>
</tr>
<tr>
<td>▪ Tropical fruits, sea food, beyond production capacity</td>
<td>○ Shrimp: China, Bangladesh, S. Korea</td>
</tr>
<tr>
<td>❖ Increase dependence on imported foods</td>
<td>▪ Blue crab: Maryland-style crab cakes in the grocery's frozen food section…the crab meat mostly comes from Indonesia, Thailand or the Philippines.</td>
</tr>
<tr>
<td>▪ Food travels longer distances than ever</td>
<td></td>
</tr>
<tr>
<td>▪ Production scattered around the world</td>
<td></td>
</tr>
<tr>
<td>❖ Food Safety Modernization Act</td>
<td></td>
</tr>
<tr>
<td>▪ Changes to Food, Drug and Cosmetics Acts of 1938</td>
<td></td>
</tr>
</tbody>
</table>

### Examples

| ❖ Apple juice:                                                          |
| ▪ 85% of the apple juice Americans drink is imported                    |
| ▪ But only about 7% of the apples                                       |

**Imports of regulated products increased nearly threefold between 2002 and 2010** (Gill, 2011)
## Joint Institute for Food Safety and Applied Nutrition (JIFSAN)

<table>
<thead>
<tr>
<th>When?</th>
<th>What?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Established in 1996.</td>
<td>A multidisciplinary research, education and outreach program – domestic and international in scope</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>How?</th>
<th>Why?</th>
</tr>
</thead>
<tbody>
<tr>
<td>A collaborative effort between the University of Maryland, the U.S. Food and Drug Administration (CFSAN and CVM), and the private sector</td>
<td>Difficult to conduct all the research needs to improve food safety, train people in risk analysis and rapidly changing lab methods for detection of food safety hazards in developed and developing countries, and for government to get data from industry</td>
</tr>
</tbody>
</table>

### Concepts of Operation

- Build programs through partnerships
- Leverage and share resources
- Create a neutral environment conducive to exchange of ideas and conducting research
- Develop international collaborations
JIFSAN Training Portfolio

International training programs

- Good Agricultural Practices (GAP)
- Good Aquacultural Practices (GAqP)
- Commercially Sterile Packaged Foods (CSPF)
- Food Inspector training (FIT)

Food Safety Risk Analysis Training Program

International Food Safety Training Laboratory
Hands-on training on standard methods for detecting chemical and microbial contaminants in food in a state-of-the-art facility being built with the support from 

Waters Corporation  
Summer 2011  

Expert Training  
State of the Art Facility
Food Modernization Act charged FDA to develop a comprehensive plan to expand the technical, scientific and regulatory capacity of foreign governments, and their respective food industries, from which the foods are exported to the US.

**FDA asked Joint Institute for Food Safety and Applied Nutrition – Spring 2012**

To develop a pilot evaluation tools/instruments to measure effectiveness and impact of JIFSAN’s international capacity building training programs.

“The FDA Food Safety Modernization Act (FSMA), the most sweeping reform of our food safety laws in more than 70 years, was signed into law by President Obama on January 4, 2011. It aims to ensure the U.S. food supply is safe by shifting the focus from responding to contamination to preventing it.”

*from FDA.gov*
Literature Review – Training Valuation
General Models

Kirkpatrick’s 4 steps Model

Level-1 REACTION

Level-2 LEARNING

Level-3 CHANGE

Level-4 RESULTS

Level-5 ROI/ROE

Phillips
Literature Review – Training Valuation
General Models

CIPP Model
- Context
- Process
- INPUT
- CIPP
- Product

Bushnell's Systems
- INPUT
- Process
- Output
- Outcomes

Brinkerhoff's six stages
1. Goal setting
2. Program design
3. Program Implementation
4. Immediate outcomes
5. Intermediate outcomes
6. Impacts and worth

Other Models
Literature Review – Training Valuation GAP and Food Supply (hand washing)

<table>
<thead>
<tr>
<th>Literature</th>
<th>Main results</th>
</tr>
</thead>
</table>
| ❖ Survey Papers:  
  ▪ *A review of food safety and food hygiene training studies in the commercial sector* (Egan, Raats, Grubb, Eves, Lumbers, Dean, & Adams, 2007)  
  ▪ *Meta-Analysis of Food Safety Training on Hand Hygiene Knowledge and Attitudes among Food Handlers* (Soon, Baines, & Seaman, 2012)  
  ▪ Other relevant articles (…) | ❖ “The need for the development of evaluation criteria of effectiveness of food hygiene training”  
  ❖ Most studies focus on handwashing and hygiene in restaurants |
### Literature Review
Related training & Policy framework

<table>
<thead>
<tr>
<th>Capacity Building</th>
<th>Policy Framework</th>
</tr>
</thead>
<tbody>
<tr>
<td>❖ Evaluation of Capacity-Building Interventions – related sectors (Health)</td>
<td>❖ Incentives and barriers to the adoption of Good Agricultural Practices</td>
</tr>
<tr>
<td></td>
<td>❖ Impact of food safety regulations (HACCP, US SPS, EU) on exports (LDCs).</td>
</tr>
<tr>
<td></td>
<td>❖ Consumer</td>
</tr>
</tbody>
</table>
## Outcome of Literature Review

<table>
<thead>
<tr>
<th>Developed strategy</th>
<th>Review paper</th>
</tr>
</thead>
<tbody>
<tr>
<td>❖ Identify the necessary data</td>
<td>❖ The general discussion on capacity building valuation</td>
</tr>
<tr>
<td>❖ Refocus the approach and refine tools (tests and questionnaires)</td>
<td>❖ Summary of studies on the valuation of Food Safety Capacity Building programs</td>
</tr>
<tr>
<td>❖ Improve the communication and engage partners</td>
<td>❖ Identify gaps in the literature on the valuation of Food Safety Capacity Building programs</td>
</tr>
</tbody>
</table>
**METRICS: Approach to Evaluating the Effectiveness of JISFAN Training Courses**

- **Trainees**
  - **Q1**: Pre-training (Self assessment)
  - **FT1**: Pre-training (Factual test)
  - **Q2**: Post-training (Self assessment)
  - **FT2**: Post-training (Factual test)
  - **Q3**: Post-training (Instructors Assessment)
  - JISFAN Training Course

- **Instructor(s)**
  - **Q4**: Follow-up (Self assessment)

- **External Sources**
  - Process Evaluation (Conducted immediately pre- and post-training)
  - Outcome Evaluation (Conducted 6 & 12 months post-training)
  - Impact Evaluation (Conducted >1 year post-training)

- Further analysis (Need to establish link between outcome and impact)
- Statistical Source Review of Impact Indicators

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Joint Institute for Food Safety and Applied Nutrition
Process Evaluations

• **Pre-training self assessment** – Provides the trainers insight into the group that is about to be trained, such as what they think their skill levels are, and helps the trainers identify the specific raining needs for that country/commodity/lab testing method;

• **Post-training self assessment** – Assesses the participant’s views and satisfaction with the different components of the training, including the instructors’ teaching abilities, and contains a self-assessment of one’s understanding and readiness to implement the different components covered during the training;

• **Factual test (pre and post)** – Provides a quantifiable measure on the knowledge gained during the training program;
<table>
<thead>
<tr>
<th>General Information</th>
<th>Demographics</th>
<th>Gender, Country, Age</th>
<th>Pre Questionnaire</th>
<th>Post Questionnaire</th>
</tr>
</thead>
<tbody>
<tr>
<td>Education</td>
<td>English-Proficiency, HIGHEST level of Education, Diplomas and certificates, and formal academic training</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Professional experience</td>
<td>Sector (Federal, State, Private…), area, PRIMARY function, years in position &amp; years in profession</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Previous trainings</td>
<td>International (JIFSAN), REGIONAL or NATIONAL, online JIFSAN course</td>
<td>X</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>General satisfaction</th>
<th>Personal goals achieved</th>
<th>Pre Questionnaire</th>
<th>Post Questionnaire</th>
</tr>
</thead>
<tbody>
<tr>
<td>Training</td>
<td>(Clarity, content, practice exercises, materials, relevancy, consistent with ads)</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Instructors</td>
<td>(Expertise, communication, teaching, responsiveness)</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Environment</td>
<td>(Room, length, food)</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Tests and assessments</td>
<td>Appropriate content, Helpful, Strength/Weakness, Too many/long, Not enough/short</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Learning - Factual tests and Self Ranking</th>
<th>Self Ranking -prior to the training</th>
<th>Pre Questionnaire</th>
<th>Post Questionnaire</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self Ranking - After the training</td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Satisfaction with the training:</td>
<td>List of topics (Aquaculture Production, Hatchery &amp; Grow-Out, Seafood HACCP, Processing, Sanitation, &amp; Traceability, US FDA Rules &amp; Regulations, Food Safety &amp; Prevention Programs)</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Ability in applying the new skills</th>
<th>List of topics, list of lab procedures</th>
<th>Pre Questionnaire</th>
<th>Post Questionnaire</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Targeting and multipliers</th>
<th>Involved in training activities</th>
<th>Pre Questionnaire</th>
<th>Post Questionnaire</th>
</tr>
</thead>
<tbody>
<tr>
<td>GAPs () trainings provided last year</td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Other trainings provided last year</td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Company export product to US</td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Company export product to US from own farm</td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Involvement in Inspection/regulation of Exports to US</td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>
## Process Evaluations

<table>
<thead>
<tr>
<th>Needs, expectations &amp; motivation</th>
<th>Pre Questionnaire</th>
<th>Post Questionnaire</th>
</tr>
</thead>
<tbody>
<tr>
<td>Important training needs for participant</td>
<td>List of topics, list of lab procedures</td>
<td>X</td>
</tr>
<tr>
<td>Important training needs for participant's organization (post &amp; pre)</td>
<td>List of topics, list of lab procedures</td>
<td>X</td>
</tr>
<tr>
<td>Motivations</td>
<td>Involvement in training, Improved skills, Better job, New Opportunities, Advancement in career, Other</td>
<td>X</td>
</tr>
<tr>
<td>Primary source of funding</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Payments</td>
<td></td>
<td>X</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Barriers</th>
<th>Pre Questionnaire</th>
<th>Post Questionnaire</th>
</tr>
</thead>
<tbody>
<tr>
<td>Potential reasons that will make it difficult for you to implement training</td>
<td>None, Infrastructure, Access, Equipment, Recognition, Other</td>
<td>X</td>
</tr>
<tr>
<td>Potential reasons that made it difficult for you to achieve your goals from the training:</td>
<td>None, Limited Experience, Language issues, Material not relevant, Unprepared (advanced) course, Other</td>
<td>X</td>
</tr>
<tr>
<td>Labor barriers</td>
<td>Understaffed / Overworked, Not trained in Applying HACCP, Not trained in Applying GAqP, No GAqP/Food Safety Plan, No Middlemen, Other, None</td>
<td>X</td>
</tr>
<tr>
<td>Institutional or organizational barriers</td>
<td>Lack of regulations, Lack of accreditation, Lack of awareness, Problems with traceability, Other, None</td>
<td>X</td>
</tr>
<tr>
<td>Equipment and/or infrastructure barriers</td>
<td>Testing/Lab equipment, Sanitation Equipment, Filtration systems, Ice production, Aquariums, Other, None</td>
<td>X</td>
</tr>
<tr>
<td>Country infrastructure barriers along the supply chain</td>
<td>Inadequate cold storage, Bottlenecks at shipment points, Utilities, Approved drugs, Other, None</td>
<td>X</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Feedback &amp; evaluation</th>
<th>Pre Questionnaire</th>
<th>Post Questionnaire</th>
</tr>
</thead>
<tbody>
<tr>
<td>Suggestions to improve the training (pre post), like the most, like the least</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Suggestions to improve the Questionnaire</td>
<td></td>
<td>X</td>
</tr>
</tbody>
</table>
Pre-training Assessments: Participants’ and organization’s training needs

- The Importance of GAgP and GMP
- GAgPs before processing
- Applied GAgPs
- Traceability
- Use of Chemo-therapeutics
- Applied HACCP
- Developing an Effective Training Course
- Food Laws and Regulations
- Practical Exercises
- Other

Organization
Participant

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Pre-training Assessments: Reported barriers to food safety

Pre-training: Participants reported barriers: Company equipment and laboratory

Pre-training: Participants reported barriers: Country Infrastructure
Metrics – 1st Process Indicators Self-Assessment

Rank your Knowledge:

![Chart showing knowledge ranking before and after training.](chart)

Your Goals were achieved:

- Strongly Agree: 30%
- Agree: 56%
- Disagree: 4%
- Neither: 6%

Would you recommend this training:

- Yes: 91%
- Other: 9%
- No: 0%
- Maybe: 9%

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Joint Institute for Food safety and Applied Nutrition

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Metrics – 1st Process Indicators Self-Assessment

Satisfaction with the Different Segments of the Training

- **Importance of GAP and GMP**
- **Good Agricultural Practices**
- **Good Manufacturing Practices**
- **Fresh Produce**
- **Pesticides and Food Safety**
- **Food Safety & Quality Assurance**
- **Developing Effective Training**
- **Food Laws & Regulations**
- **Practical Exercises**

**Metrics** – 1st Process Indicators Self-Assessment

**Satisfaction with the Different Segments of the Training**

- **Strongly Disagree**
- **Disagree**
- **Neither**
- **Agree**
- **Strongly Agree**

**# of respondents (out of 56 total)**

**Importance of GAP and GMP:**

- Strongly Disagree: 0
- Disagree: 0
- Neither: 0
- Agree: 0
- Strongly Agree: 0

**Good Agricultural Practices:**

- Strongly Disagree: 0
- Disagree: 0
- Neither: 0
- Agree: 0
- Strongly Agree: 0

**Good Manufacturing Practices:**

- Strongly Disagree: 0
- Disagree: 0
- Neither: 0
- Agree: 0
- Strongly Agree: 0

**Fresh Produce:**

- Strongly Disagree: 0
- Disagree: 0
- Neither: 0
- Agree: 0
- Strongly Agree: 0

**Pesticides and Food Safety:**

- Strongly Disagree: 0
- Disagree: 0
- Neither: 0
- Agree: 0
- Strongly Agree: 0

**Food Safety & Quality Assurance:**

- Strongly Disagree: 0
- Disagree: 0
- Neither: 0
- Agree: 0
- Strongly Agree: 0

**Developing Effective Training:**

- Strongly Disagree: 0
- Disagree: 0
- Neither: 0
- Agree: 0
- Strongly Agree: 0

**Food Laws & Regulations:**

- Strongly Disagree: 0
- Disagree: 0
- Neither: 0
- Agree: 0
- Strongly Agree: 0

**Practical Exercises:**

- Strongly Disagree: 0
- Disagree: 0
- Neither: 0
- Agree: 0
- Strongly Agree: 0
Metrics – 2nd Process Indicator

Factual Test

- Provides a quantifiable measure on the impact of the training program;
- Survey tests administered in class via ‘digi-voting’ to make it pleasant and interactive for the trainees; results displayed on PowerPoint;
- Anonymous - answer fall in a bar chart vis-à-vis the other students;
- Enables us to gauge what people learned during the training, and identify potential areas where improvement is needed
Metrics – 2\textsuperscript{nd} Process Indicator
Factual Tests

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Some socio-economic factors

<table>
<thead>
<tr>
<th>Category of Age</th>
<th>25-34 years</th>
<th>35-44 years</th>
<th>45-54 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Observations</td>
<td>17</td>
<td>7</td>
<td>2</td>
</tr>
<tr>
<td>Pre test</td>
<td>16.5</td>
<td>18.4</td>
<td>17.0</td>
</tr>
<tr>
<td>Post test</td>
<td>23.6</td>
<td>22.4</td>
<td>22.0</td>
</tr>
<tr>
<td>Change</td>
<td>7.1</td>
<td>4.0</td>
<td>5.0</td>
</tr>
</tbody>
</table>

Bachelor vs Master

<table>
<thead>
<tr>
<th>Bachelor</th>
<th>Master</th>
</tr>
</thead>
<tbody>
<tr>
<td>Observations</td>
<td>19</td>
</tr>
<tr>
<td>Pre test</td>
<td>16.68</td>
</tr>
<tr>
<td>Post test</td>
<td>23.32</td>
</tr>
<tr>
<td>Change</td>
<td>6.63</td>
</tr>
</tbody>
</table>

Private vs Public

<table>
<thead>
<tr>
<th>Private</th>
<th>Public</th>
</tr>
</thead>
<tbody>
<tr>
<td>Observations</td>
<td>3</td>
</tr>
<tr>
<td>Pre test</td>
<td>14.0</td>
</tr>
<tr>
<td>Post test</td>
<td>22.7</td>
</tr>
<tr>
<td>Change</td>
<td>8.7</td>
</tr>
</tbody>
</table>

Correlation between self assessment and test scores

For some trainings there is a strong and significant correlation between the difference in the participants’ own self ranking before and after the training and the exponential of the improvement in the test result.
Piloting 6-12 months after initial training in countries and with IFSTL trainings:

- What did participants learn during the training that they were able to incorporate into their own training programs?
- Did the participants incorporate best practices into their operations? If not, then why?
- Determining if there was a multiplier effect (i.e., how many additional trainings occurred)

Information obtained will assist partners in understanding what people were able to incorporate into their own trainings, what further type of trainings they feel is needed, and the multiplier effect.

Process of administering these in Honduras, Ecuador, Vietnam using googledocs, will begin follow up for labs this fall
Impact evaluation-attribution (Fall 2013)

- Using secondary data (see if can link outcome to impact)
  - Reduction in rejection of imported product from countries with training (look to us FDA data)
  - Increase in rejection rate in countries (by inspectors who participated in the training)
  - Reduced foodborne disease from people traveling aboard
  - Ultimately reduction in foodborne disease in countries where food produced (spillover effects)
Status of Administration of Surveys

- Piloting approach 1.5 years
  - End of the year administered 4-5 survey instruments in ~ 40 courses
  - To date:
    - GAP - Honduras (regional), India, Ecuador, Jamaica, México
    - GAqP - India (3x), Vietnam
    - FIT - China
    - Lab – 8 X
    - Risk Analysis – 9 X (w/o Overview)
Nine Main Gaps in Developing Country Systems

Government standard-setting body

- Adherence to standards
- Controlling supply chains
- Infrastructure deficits
- Legal Foundation
- Workforce Problems
- Fragmentation
- Poor Surveillance Systems
- Communications
- Political Will

Ensuring Safe Foods and Medical Products through Stronger Regulatory Systems Abroad
Core Elements of Regulatory Systems

**Government standard-setting body**
- Use science and risk as a basis for developing policy;
- Participate in international cooperation and harmonization of standards;
- Make ethical decisions and recognize, collect, and transmit evidence when breaches of law occur.

**A food product regulatory system integrates:**
- Product safety through good manufacturing, laboratory, and agricultural practices;
- Staff development and training for employees;
- Monitoring and evaluation of product quality using laboratories;
- Inspection and surveillance of products throughout the supply chain; and
- Risk assessment, analysis, and management; and
- Emergency response