



LOUVAIN
School of Management

UNIVERSITE CATHOLIQUE DE LOUVAIN
LOUVAIN SCHOOL OF MANAGEMENT

Appendix

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Mémoire-projet présenté par
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en vue de l'obtention du titre de
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Appendix 1: Conceptual Analysis Tables

Variable 1: Learning Organization Structure		
Concepts	Dimensions	Indicators
Supportive Learning Environment	Psychological Safety	In this department, it is easy to speak up about what is on your mind
		If you make a mistake in this department, it is often held against you
		People in this department are usually comfortable talking about problems and disagreements
		People in this department are eager to share information about what does and doesn't work
		Keeping your cards close to your vest is the best way to get ahead in this department
	Time for reflection	People in this dept. are overly stressed
		Despite the workload, people in this dept. find time to review how the work is going
		In this dept., schedule pressure gets in the way of doing a good job
		In this dept., people are too busy to invest time in improvement
		There is simply no time for reflection in this dept.
	Appreciation of differences	Differences in opinion are welcome in this dept.
		Unless an opinion is consistent with what most people in this dept. believe, it won't be valued
		This dept. tends to handle differences of opinion privately or off-line, rather than addressing them directly with the group
		In this dept., people are open to alternative ways of getting work done
	Openness to new ideas	In this dept., people value new ideas
		Unless an idea has been around for a long time, no one in this dept. wants to hear it
		In this dept., people are interested in better ways of doing things
		In this dept., people often resist untried approaches

Concrete processes and practices	Experimentation	This dept. experiments frequently with new ways of working
		This dept. experiments frequently with new product or service offerings
		This dept. has a formal process for conducting and evaluating experiments or new ideas
		This dept. frequently employs prototypes or simulations when trying out new ideas
	Information Collection	This unit systematically collect information on competitors
		This unit systematically collect information on customers
		This unit systematically collect information on economic and social trends
		This unit systematically collect information on technological trends
		This unit frequently compares its performance with that of competitors
		This unit frequently compares its performance with that of best-in-class organizations
	Analysis	This dept. engages in productive conflict and debate during discussions
		This unit never revisits well-established perspectives during discussions
		This unit frequently identifies and discusses underlying assumptions that might affect key decisions
		This unit never pays attention to different views during discussions.
	Education and training	Newly hired employees in this dept. receive adequate training
		Experienced employees in this dept. receive periodic training and training updates
		Experienced employees in this dept. receive training when switching to a new position
		Experienced employees in this dept. receive training when new initiatives are launched
		In this dept., training is valued
		In this dept., time is made available for education and training activities.
	Information transfer	This unit has forums for meeting with and learning from experts from other departments, teams, or divisions
		This unit has forums for meeting with and learning from experts from outside the organization
		This unit has forums for meeting with and learning from customers and clients
		This unit has forums for meeting with and learning from suppliers

		This dept. regularly shares information with networks of experts within the organization
		This dept. regularly shares information with networks of experts outside the organization
		This dept. quickly and accurately communicates new knowledge to key decision makers
		This dept. regularly conducts post-audits and after-action interviews
Leadership that foster learning	Leadership openness	The managers invite input from others in discussions
		The managers acknowledge their own limitations with respect to knowledge, information, or expertise
		The managers ask probing questions
		The managers listen attentively
		The managers encourage multiple points of view
		The managers provide time, resources, and venues for identifying problems and organizational challenges
		The managers provide time, resources, and venues for reflecting and improving on past performance
		The managers criticize views different from their own

Variable 2: Organizational Learning Process		
Concepts	Dimensions	Indicators
Feed-back	Operational level	Existence of a plan and SOP
	Tactical level	Existence of a plan and SOP
	Strategic level	Existence of a plan and SOP
Feed-forward	Intuition	SOP for brainstorming session
	Interpretation	SOP for mapping
	Integration	Reporting and meeting SOP
	Institutionalization	SOP for new product
		SOP for new procedures
		SOP for new structures
		SOP for new strategies

Variable 3: Business Performance		
Concepts	Dimensions	Indicators
Cost efficiency	Learning effects	Capture experience effects by standardizing and repeating processes and designs at the component level
		Capture experience effects by standardizing and repeating processes and designs at the project mgmt. Level
	Location and technology effects	Understand the potential impact of future technologies on the overall cost of the project
		Understand the potential impact of locations on the overall cost of the project
	Value-Based Offer	Understand clients key purchasing criteria
		Design projects to meet client's needs
	Optimized technical specifications	Identify main costs and redefine them for future projects while maintaining performance and quality standards
	Standardization and modularization	Standardize designs for components that can be used on multiple projects
	Upgraded existing designs	Modify initial designs to lower costs by applying new technologies
		Modify initial designs to reach better quality, and/or operability by applying new technologies
	Supplier management	Systematically assess and classify current and potential suppliers
		Improve the quality of key suppliers
		Deepen relationships with top performer suppliers
		Consolidate supplier bases
	Demand management	Adjust procurement quality to the project's real requirements
	Process Excellence	Optimize costs over the entire life cycle of project
	Secure resources	Proactive recruiting
		Develop the skills of existing staff
		Encourage commitment in the workforce
Value creation	Energy performance	Guarantee the total running hours of the biogas engine
		Guarantee the total biogas captured per month
		Guarantee the average percentage of CH ₄ in biogas
		Guarantee the average ppm of H ₂ S to engine
		Guarantee the electricity generation
	Environmental performance	Guarantee the Chemical Organic Demand (COD) removal efficiency
		Guarantee the Biological Organic Demand (BOD) removal efficiency

		Guarantee the Total Suspended Solid (TSS) removal efficiency
	Agronomic performance	Improve the chemical fertilizers substitution
		Improve the yield of fruit production
		Improve the quantity of organic matter in the soil
	Practical and aesthetics	Systematically improve practical features
		Systematically improve aesthetics features

Appendix 2: Learning Organization Survey

Thank you for your interest in BIA Organizational Learning Survey. This is a framework based on the article "Is Yours a Learning Organization?" (Harvard Business Review, March 2008).

The survey is meant for establishing the real picture of organizational learning in BIA and create value for the company as a whole. It is not in any case a personal assessment and there is no intention of analyzing individual answers. The total answers will be combined in an average and compared to a previous established benchmark. By the way, the survey is anonymous. So feel free to tell what is in your mind.

Note 1: refer only to your own department (department) when required

Note 2: if you don't know what to answer, please indicate "neither accurate nor inaccurate"

If you have any doubts, questions, comments, what so ever, please write to me: olivier.deschutter@bio-tec.net

Olivier de Schutter

(For the ones who don't know me yet, feel free to connect: <https://my.linkedin.com/in/olivierdeschuttermib>)

Please tick only one box		Highly inaccurate	Moderately inaccurate	Slightly inaccurate	Neither inaccurate nor accurate	Slightly accurate	Moderately accurate	Highly accurate
Please respond to each item in terms of how descriptive it is of your department	Newly hired employees in this department receive adequate training							
	Experienced employees in this department receive periodic training and training updates.							
	Experienced employees in this department receive training when switching to a new position							

Please tick only one box		Highly inaccurate	Moderately inaccurate	Slightly inaccurate	Neither inaccurate nor accurate	Slightly accurate	Moderately accurate	Highly accurate
Please respond to each item in terms of how descriptive it is of your department	Experienced employees in this department receive training when new initiatives are launched							
	In this department, training is valued.							
	In this department, time is made available for education and training activities.							
This department has forums for meeting with and learning from:	other departments, teams, or divisions							
	experts from outside the organization							
	customers and clients							
	suppliers							
Please respond to each item in terms of how descriptive it is of your department.	Differences in opinion are welcome in this department.							
	This department regularly shares information with networks of experts outside the organization.							
	This department quickly and accurately communicates new knowledge to key decision makers.							

Please tick only one box		Highly inaccurate	Moderately inaccurate	Slightly inaccurate	Neither inaccurate nor accurate	Slightly accurate	Moderately accurate	Highly accurate
Please respond to each item in terms of how descriptive it is of your department.	Unless an opinion is consistent with what most people in this department believe, it won't be valued.							
	This department tends to handle differences of opinion privately or off-line, rather than addressing them directly with the group.							
	In this department, people are open to alternative ways of getting work done.							
Please respond to each item in terms of how descriptive it is of your department.	In this department, people value new ideas.							
	Unless an idea has been around for a long time, no one in this department wants to hear it.							
	In this department, people are interested in better ways of doing things.							
	In this department, people often resist untried approaches.							
Please respond to each item in terms of how descriptive it is of your department.	People in this department are overly stressed.							

Please tick only one box		Highly inaccurate	Moderately inaccurate	Slightly inaccurate	Neither inaccurate nor accurate	Slightly accurate	Moderately accurate	Highly accurate
Please respond to each item in terms of how descriptive it is of your department.	Despite the workload, people in this department find time to review how the work is going.							
	In this department, schedule pressure gets in the way of doing a good job.							
	In this department, people are too busy to invest time in improvement.							
	There is simply no time for reflection in this department.							
This department frequently compares its performance to:	Competitors							
	Best-in-class organization							
Please respond to each item in terms of how descriptive it is of your department.	This department engages in productive conflict and debate during discussions.							
	This department seeks out dissenting views during discussions.							
	This department never revisits well-established perspectives during discussions.							
	This department frequently identifies and discusses underlying assumptions that might affect key decisions.							

Please tick only one box		Highly inaccurate	Moderately inaccurate	Slightly inaccurate	Neither inaccurate nor accurate	Slightly accurate	Moderately accurate	Highly accurate
Please respond to each item in terms of how descriptive it is of your department.	This department never pays attention to different views during discussions.							
	This department experiments frequently with new ways of working.							
	This department experiments frequently with new product or service offerings.							
	This department has a formal process for conducting and evaluating experiments or new ideas.							
	This department frequently employs prototypes or simulations when trying out new ideas.							
This department systematically collects information on	Competitors							
	Customers							
	economic and social trends							
	technological trends							
Please respond to each item in terms of how descriptive it is of your department.	In this department, it is easy to speak up about what is on your mind.							

Please tick only one box		Highly inaccurate	Moderately inaccurate	Slightly inaccurate	Neither inaccurate nor accurate	Slightly accurate	Moderately accurate	Highly accurate
	If you make a mistake in this department, it is often held against you.							
	People in this department are usually comfortable talking about problems and disagreements.							
	People in this department are eager to share information about what does and doesn't work.							
	Keeping your cards close to your vest is the best way to get ahead in this department.							
Please respond to each item in terms of how descriptive it is of your department.	This department regularly shares information with networks of experts within the organization.							
	This department regularly shares information with networks of experts outside the organization.							
	This department quickly and accurately communicates new knowledge to key decision makers.							
	This department regularly conducts post audits and after-action reviews.							

Please tick only one box		Highly inaccurate	Moderately inaccurate	Slightly inaccurate	Neither inaccurate nor accurate	Slightly accurate	Moderately accurate	Highly accurate
Please respond to each item in terms of how descriptive it is of your department.	My managers invite input from others in discussions.							
	My managers acknowledge their own limitations with respect to knowledge, information, or expertise.							
	My managers ask probing questions.							
	My managers listen attentively.							
	My managers encourage multiple points of view.							
	My managers provide time, resources, and venues for identifying problems and organizational challenges.							
	My managers provide time, resources, and venues for reflecting and improving on past performance.							
	My managers criticize views different from their own.							

Appendix 3: Interview guide

1. Introduction

1.1. What is the department you work in?

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1.2. What are the key activities of the department you work in?

--

2. FMO integration

2.1. What can Biotech learn from the integration of FMO in its business model?

2.2. Does FMO integration improve the value creation or cost efficiency?

--

2.3. According to you, what are the main improvements due to FMO so far?

2.3.1. Then rank them in order from the most significant to the least significant.

--

2.4. Please categorize them according to the nature of the improvement

[illegible]

Cost efficiency

3. Does FMO integration systematically impact expenditures reduction?

--

3.1. Learning effects: FMO integration allows to capture experience effects by standardizing and repeating processes and designs at the component level

I strongly agree	I agree	I slightly agree	I slightly disagree	I disagree	I strongly disagree	I don't know

3.2. Learning effects: FMO integration allows to capture experience effects by standardizing and repeating processes and designs at the project mgmt. level

I strongly agree	I agree	I slightly agree	I slightly disagree	I disagree	I strongly disagree	I don't know

3.3. Location and technology effects: FMO integration allows to understand the potential impact of future technologies on the overall cost of the project

I strongly agree	I agree	I slightly agree	I slightly disagree	I disagree	I strongly disagree	I don't know

3.4. Location and technology effects: FMO integration allows to understand the potential impact of locations on the overall cost of the project

I strongly agree	I agree	I slightly agree	I slightly disagree	I disagree	I strongly disagree	I don't know

3.5. Value-Based Offer: FMO integration allows to understand clients key purchasing criteria

I strongly agree	I agree	I slightly agree	I slightly disagree	I disagree	I strongly disagree	I don't know

3.6. Value-Based Offer: FMO integration allows to design projects to meet client's needs

I strongly agree	I agree	I slightly agree	I slightly disagree	I disagree	I strongly disagree	I don't know

3.7. Optimized technical specifications: FMO integration allows to identify main costs and redefine them for future projects while maintaining performance and quality standards

I strongly agree	I agree	I slightly agree	I slightly disagree	I disagree	I strongly disagree	I don't know

3.8. Standardization and modularization: FMO integration allows to standardize designs for components that can be used on multiple projects

I strongly agree	I agree	I slightly agree	I slightly disagree	I disagree	I strongly disagree	I don't know

3.9. Upgraded existing designs: FMO integration allows to modify initial designs to lower costs by applying new technologies

I strongly agree	I agree	I slightly agree	I slightly disagree	I disagree	I strongly disagree	I don't know

3.10. Upgraded existing designs: FMO integration allows to modify initial designs to reach better quality, and/or operability by applying new technologies

I strongly agree	I agree	I slightly agree	I slightly disagree	I disagree	I strongly disagree	I don't know

- 3.11. Supplier management: FMO integration allows to systematically assess and classify current and potential suppliers

I strongly agree	I agree	I slightly agree	I slightly disagree	I disagree	I strongly disagree	I don't know

- 3.12. Supplier management: FMO integration allows to improve the quality of key suppliers

I strongly agree	I agree	I slightly agree	I slightly disagree	I disagree	I strongly disagree	I don't know

- 3.13. Supplier management: FMO integration allows to deepen relationships with top performer suppliers

I strongly agree	I agree	I slightly agree	I slightly disagree	I disagree	I strongly disagree	I don't know

- 3.14. Supplier management: FMO integration allows to consolidate supplier bases

I strongly agree	I agree	I slightly agree	I slightly disagree	I disagree	I strongly disagree	I don't know

- 3.15. Demand management: FMO integration allows to adjust procurement quality to the project's real requirements

I strongly agree	I agree	I slightly agree	I slightly disagree	I disagree	I strongly disagree	I don't know

- 3.16. Process Excellence: FMO integration allows to optimize costs over the entire life cycle of project

I strongly agree	I agree	I slightly agree	I slightly disagree	I disagree	I strongly disagree	I don't know

3.17. Secure resources: FMO integration allows proactive recruiting

I strongly agree	I agree	I slightly agree	I slightly disagree	I disagree	I strongly disagree	I don't know

3.18. Secure resources: FMO integration allows to develop the skills of existing staff

I strongly agree	I agree	I slightly agree	I slightly disagree	I disagree	I strongly disagree	I don't know

3.19. Secure resources: FMO integration allows to encourage commitment in the workforce

I strongly agree	I agree	I slightly agree	I slightly disagree	I disagree	I strongly disagree	I don't know

4. Value creation (improvement of KPI)

4.1. Does FMO integration systematically impact process KPI improvement?

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4.2. Energy performance indicators: FMO integration allows to guarantee the total running hours of the biogas engine

I strongly agree	I agree	I slightly agree	I slightly disagree	I disagree	I strongly disagree	I don't know

4.3. Energy performance indicators: FMO integration allows to guarantee the total biogas captured per month

I strongly agree	I agree	I slightly agree	I slightly disagree	I disagree	I strongly disagree	I don't know

4.4. Energy performance indicators: FMO integration allows to guarantee the average percentage of CH₄ in biogas

I strongly agree	I agree	I slightly agree	I slightly disagree	I disagree	I strongly disagree	I don't know

4.5. Energy performance indicators: FMO integration allows to guarantee the average ppm of H₂S to engine

I strongly agree	I agree	I slightly agree	I slightly disagree	I disagree	I strongly disagree	I don't know

4.6. Energy performance indicators: FMO integration allows to guarantee the electricity generation

I strongly agree	I agree	I slightly agree	I slightly disagree	I disagree	I strongly disagree	I don't know

4.7. Environmental performance indicators: FMO integration allows to guarantee the Chemical Organic Demand (COD) removal efficiency

I strongly agree	I agree	I slightly agree	I slightly disagree	I disagree	I strongly disagree	I don't know

4.8. Environmental performance indicators: FMO integration allows to guarantee the Biological Organic Demand (BOD) removal efficiency

I strongly agree	I agree	I slightly agree	I slightly disagree	I disagree	I strongly disagree	I don't know

4.9. Environmental performance indicators: FMO integration allows to guarantee the Total Suspended Solid (TSS) removal efficiency

I strongly agree	I agree	I slightly agree	I slightly disagree	I disagree	I strongly disagree	I don't know

4.10. Agronomic performance indicators: FMO integration allows to improve the chemical fertilizers substitution

I strongly agree	I agree	I slightly agree	I slightly disagree	I disagree	I strongly disagree	I don't know

4.11. Agronomic performance indicators: FMO integration allows to improve the yield of fruit production

I strongly agree	I agree	I slightly agree	I slightly disagree	I disagree	I strongly disagree	I don't know

- 4.12. Agronomic performance indicators: FMO integration allows to improve the quantity of organic matter in the soil

I strongly agree	I agree	I slightly agree	I slightly disagree	I disagree	I strongly disagree	I don't know

5. Improvement of practical and aesthetics features of the plants

- 5.1. Does FMO integration systematically impact practical and aesthetics features of the plants?

--

- 5.2. FMO integration systematically improve practical features

I strongly agree	I agree	I slightly agree	I slightly disagree	I disagree	I strongly disagree	I don't know

- 5.3. FMO integration systematically improve aesthetics features

I strongly agree	I agree	I slightly agree	I slightly disagree	I disagree	I strongly disagree	I don't know

6. Eventual Comment:

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Appendix 4: Results of the Learning Organization Survey

Indicators	BIA	FMO	PMO	TS	COM	ADMIN	QA	EC
Average of Psychological safety [In this department, it is easy to speak up about what is on your mind.]	80	76	83	68	86	86	100	86
Average of Psychological safety [If you make a mistake in this department, it is often held against you.]	59	67	49	57	76	29	57	100
Average of Psychological safety [People in this department are usually comfortable talking about problems and disagreements.]	75	67	80	75	81	71	86	86
Average of Psychological safety [People in this department are eager to share information about what does and doesn't work.]	76	73	74	82	86	57	100	86
Average of Psychological safety [Keeping your cards close to your vest is the best way to get ahead in this department.]	70	61	89	64	76	71	14	100
Psychological Safety	72	69	75	69	81	63	71	91
Average of Time for reflection [People in this dept. are overly stressed.]	57	69	69	50	48	29	71	43
Average of Time for reflection [Despite the workload, people in this dept. find time to review how the work is going.]	71	61	83	64	67	71	100	100
Average of Time for reflection [In this dept., schedule pressure gets in the way of doing a good job.]	44	43	60	36	43	29	14	86
Average of Time for reflection [In this dept., people are too busy to invest time in improvement.]	54	51	66	50	57	29	43	100
Average of Time for reflection [There is simply no time for reflection in this dpt.]	62	65	66	57	62	29	100	100
Time for reflection	58	58	69	51	55	37	66	86
Average of Appreciation of differences [Differences in opinion are welcome in this dpt.]	88	90	89	82	86	86	100	86
Average of Appreciation of differences [Unless an opinion is consistent with what most people in this dept. believe, it won't be valued.]	60	61	77	54	52	43	29	86
Average of Appreciation of differences [This dept. tends to handle differences of opinion privately or off-line, rather than addressing them directly with the group.]	61	61	74	57	62	43	29	86

Average of Appreciation of differences [In this dept., people are open to alternative ways of getting work done.]	82	84	80	82	62	100	71	100
Appreciation of differences	72	74	80	69	65	68	57	89
Average of Openness to new ideas [In this dept., people value new ideas.]	86	86	77	75	90	100	100	100
Average of Openness to new ideas [Unless an idea has been around for a long time, no one in this dept. wants to hear it.]	70	67	69	54	86	86	29	100
Average of Openness to new ideas [In this dept., people are interested in better ways of doing things.]	85	86	69	79	95	100	86	100
Average of Openness to new ideas [In this dept., people often resist untried approaches.]	57	65	54	36	76	71	14	29
Open to new ideas	74	76	67	61	87	89	57	82
Average of Experimentation [This dept. experiments frequently with new ways of working.]	71	69	69	79	76	57	86	86
Average of Experimentation [This dept. experiments frequently with new product or service offerings.]	59	63	63	64	71	29	86	14
Average of Experimentation [This dept. has a formal process for conducting and evaluating experiments or new ideas.]	63	63	69	54	57	71	100	14
Average of Experimentation [This dept. frequently employs prototypes or simulations when trying out new ideas.]	45	55	34	54	52	14	86	14
Experimentation	59	63	59	63	64	43	89	32
Average of Information collection [competitors]	57	57	60	61	81	14	43	86
Average of Information collection [customers]	73	59	86	75	81	57	100	86
Average of Information collection [economic and social trends]	62	67	60	75	81	14	100	29
Average of Information collection [technological trends]	67	73	66	71	81	14	100	86
Average of Information collection [competitors]2	48	57	40	50	67	14	71	29

Average of Information collection [best-in-class organizations]	62	57	63	64	57	71	100	29
Information collection	61	62	62	66	75	31	86	57
Average of Analysis [This dept. engages in productive conflict and debate during discussions.]	68	82	60	79	62	29	100	71
Average of Analysis [This unit seeks out dissenting views during discussions.]	67	61	66	75	71	57	100	57
Average of Analysis [This unit never revisits well-established perspectives during discussions.]	61	73	46	68	62	71	14	43
Average of Analysis [This unit frequently identifies and discusses underlying assumptions that might affect key decisions.]	71	76	63	79	62	71	100	57
Average of Analysis [This unit never pays attention to different views during discussions.]	80	76	80	64	81	100	100	86
Analysis	69	73	63	73	68	66	83	63
Average of Education and Training [Newly hired employees in this dept. receive adequate training.]	68	67	71	61	57	86	100	29
Average of Education and Training [Experienced employees in this dept. receive periodic training and training updates.]	65	55	63	54	67	95	100	71
Average of Education and Training [Experienced employees in this dept. receive training when switching to a new position.]	64	63	63	64	52	71	86	71
Average of Education and Training [Experienced employees in this dept. receive training when new initiatives are launched.]	68	57	69	71	57	86	86	100
Average of Education and Training [In this dept., training is valued.]	83	78	89	79	71	95	100	100
Average of Education and Training [In this dept., time is made available for education and training activities.]	70	59	71	64	62	86	100	100
Education and Training	70	63	71	65	61	87	95	79
Average of Information Transfer [experts from other departments, teams, or divisions]	74	67	66	79	67	86	100	100
Average of Information Transfer [experts from outside the organization]	57	57	49	64	62	62	71	29
Average of Information Transfer [customers and clients]	64	57	71	54	67	81	100	29

Average of Information Transfer [suppliers]	70	61	66	75	76	86	100	29
Average of Information transfer [This dept. regularly shares information with networks of experts within the organization.]	77	73	80	71	76	71	100	100
Average of Information transfer [This dept. regularly shares information with networks of experts outside the organization.]	51	59	37	46	67	29	71	71
Average of Information transfer [This dept. quickly and accurately communicates new knowledge to key decision makers.]	68	73	57	71	71	57	86	71
Average of Information transfer [This dept. regularly conducts post-audits and after-action interviews.]	64	65	54	61	57	86	100	29
Information transfer	65	64	60	65	68	70	91	57
Average of Leadership [My manager's invite input from others in discussions.]	86	84	86	75	86	100	100	86
Average of Leadership [My managers acknowledge their own limitations with respect to knowledge, information, or expertise.]	74	73	69	64	81	81	100	86
Average of Leadership [My managers ask probing questions.]	71	76	46	68	76	95	71	86
Average of Leadership [My managers listen attentively.]	83	86	89	61	81	95	100	86
Average of Leadership [My managers encourage multiple points of view.]	84	80	91	75	81	95	86	86
Average of Leadership [My managers provide time, resources, and venues for identifying problems and organizational challenges.]	79	78	80	64	81	100	100	57
Average of Leadership [My managers provide time, resources, and venues for reflecting and improving on past performance.]	77	78	74	61	76	100	100	71
Average of Leadership [My managers criticize views different from their own.]	65	57	89	57	71	67	14	71
Leadership	78	76	78	66	79	92	84	79

Appendix 5: Learning Organization Benchmark score

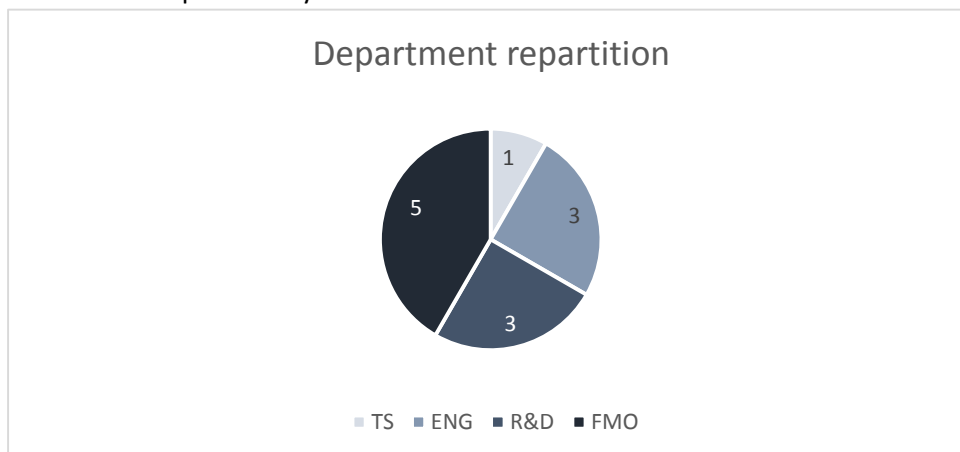
	Benchmark				
Indicators	Bottom Quartile	Second Quartile	Median	Third Quartile	Top Quartile
Psychological Safety	31–66	67–75	76	77–86	87–100
Time for reflection	14-56	57-63	64	65-79	80-100
Appreciation of differences	38-80	81-89	90	91-95	96-100
Openness to new ideas	14-35	36-49	50	51-64	65-100
Experimentation	18-53	54-70	71	72-82	83-100
Information Collection	23-70	71-79	80	81-89	90-100
Analysis	19-56	57-70	71	72-84	85-100
Education and training	26-68	69-79	80	81-89	90-100
Information transfer	34-60	61-70	71	72-82	83-97
Leader openness	33-66	67-75	76	77-82	83-100

Appendix 6: Synthesis of Interviews

- ❖ **Number of participants:** 12
- ❖ **Name of participants:** Ahmad Izuan, Aziz Nabilah, Blouin Mathieu, Cheng Andy, Gil Juan Jose, Mahsias Farhid, Pinzon Juliana, Salamanca Sandra, Sasmito Azri, Schmitt Matthieu, Valencia Paulo, Yusof Amran.

1. Introduction

1.1. What is the department you work in?



1.2. What are the key activities of the department you work in?

Department	Key activities
FMO	- <i>Planning</i> - <i>Monitoring and reporting</i> - <i>Maintenance</i>
	- <i>Monitoring</i> - <i>Compelling all the data</i> - <i>Reporting to bosses and clients</i> - <i>The key is how we process</i> - <i>FMO is the key for Biotec</i> - <i>Comment: Our competitors are good but don't offer operation in first two years (80% of competition projects fail)</i>
	- <i>Provide operation and maintenance guiding's</i> - <i>Feedback by reporting to the clients every months</i>
	- <i>Support Biotec team to manage after sales</i> - <i>Facing the client</i>
	- <i>Site audit monthly for all projects and monthly meeting with the client</i> - <i>On-site training with staff</i> - <i>Preparation of all the SOP, reports, etc.</i> - <i>Check and monitor HR (Indonesia Staff shift/overtime/...)</i> - <i>Trouble-shooting and instrument on-site calibration</i> - <i>Monitor data collection, laboratory analysis results...</i>
TS	<i>Translated from French</i> - <i>Construction management</i> - <i>Contractual agreement with engineering for Intellectual Property (IP) and information disclosure through third parties</i> - <i>Process based : Mechanic, civil, hydraulic, electric,</i> - <i>Quality control</i> - <i>Design and supply chain</i> - <i>PMO works control and monitoring (monthly construction site visit)</i>

	- <i>Precommissioning</i>
R&D	- <i>Established business, optimization & New arising problems</i> - <i>New product, BIFE, new effluents, new technology</i>
	<i>Translate from Spanish</i> - <i>Research of specific themes and information</i> - <i>Development of technical concepts</i> - <i>Pilot projects to determine engineering parameters</i>
	<i>Translated from French</i> - <i>Response to operational issues</i> - <i>Technical support: bring scientific answers with concrete results correlated with the literature</i> - <i>New concepts development and project development</i> - <i>Accumulation of literature knowledge</i> - <i>Provide a complete project (product) for commercial department</i>
ENG	<i>Translated from Spanish</i> - <i>Design</i> - <i>Biological supervision</i> - <i>Pre-commissioning and commissioning</i> - <i>Procurement support</i> - <i>Operational training</i>

2. FMO integration

2.1. What Biotec engineering can learn from the integration of FMO in its business model?

2.2. Does FMO integration improve the conception phase (design)?

- <i>Yes! Material choice, piping, automatism...</i>
- <i>Chance to feedback to engineering or R&D if malfunctioning</i> - <i>Becomes a case-study</i> - <i>Critical information from the clients feedback</i> - <i>Continuous training with the clients</i>
- <i>YES of course</i> - <i>Biotec is a new organization, we didn't have any proper tools to report to engineering, but now we do. We systematically share info with engineering. But we don't have explicit document or SOP</i>
- <i>Yes</i>
- <i>Yes these are the ones making it work. They allow to improve fine tubing.</i>
- <i>Yes in part but also thanks to TS etc.</i>
- <i>Yes in Greenwatt R&D were the ones managing the operation. There was a tight cooperation between each dpt. Here in Biotec, people are not asking for help when there are problems. There is no reciprocal interaction. There are isolated one from the other.</i> -
- <i>Oui oui tout a fait crucial !</i>
- <i>2.1) la funcionalidad de equipos y sistemas</i> - <i>Adecuar criterios base de disenos</i> - <i>Confiabilidad de equipos, proveedores y materiales</i> - <i>2.2) si el conocimiento de la operación permite incluir o eliminar ciertas líneas o unidades del proceso</i>
- <i>Yes, we need a complete project circle for inputs to improvement</i>

2.3. According to you, what are the main improvements FMO brought to the design so far? Rank them in order from the most significant to the least significant.

- <i>Still need improvement for H2S filter and agitation system</i>
- <i><u>Process know-how</u>: K transfer with Mario and Miguel going to BIA. Specifically the understanding of anaerobic biological digestion. (Not complying with COD removal KPI because too much agitation). It improves the O&M process. (1)</i> - <i><u>Electrical and engine operation</u>: engine team because maintenance from supplier not complying or too expensive (OPEX) (2)</i> - <i><u>Electrical and Instrumentation</u>: the scaling was wrong (we over or under rated the electrical current) but O&M had suspicions on their KPIs. Now there is a systematic checkup of the E&I when process KPI are not complying. (3)</i> - <i><u>Wet Biological Filter</u>: Important to replace effluent every three days every instead of a few hours (engineering learnt it from O&M in BIA). It has not been acknowledged by engineering because of miscommunication. Operators in BIA were not trusting manuals (cultural problem). (4)</i>
- <i><u>Fibber use</u>: Fibber instead of steel for boxes, means it's lighter (initiative comes from operators to TS). TS should be communicating with Cali in order to transfer K. Cooling tower: FMO and TS had a meeting to revise the materials used inside them (fiber instead of wood).</i> - <i><u>Covering wet and dry filters</u>: otherwise the non-rigid membrane is letting air getting into the gas (lowering methane %) and the material has to be replaced at an expensive cost (material is EPDM)</i> - <i><u>Reactor elevation</u>: APM water getting into the biogas pipe because it was underground. So they elevated the biodigestors (it is now in discussion)</i> - <i>Agree with E&I from Andy interview</i> - <i>Concerning wet biological filter, it depends on every plant's history. We don't know if AMSA implemented it and what would be the results. We need to know all specifications for each individual case before standardizing.</i> ➔ <i>We are mostly focusing on the KPI instead of cost saving.</i> ➔ <i>There is K flow between FMO and R&D and another TS and Engineering</i>
- <i><u>Biological filters</u>: the cover is not rigid HDPE (same as Izuan). The solution was to reinforce the cover with a PVC one or EPDM (flexible solutions) or fiber glass (rigid). This improvement is still in process. We are not satisfied about it yet. (1)</i> - <i><u>Relocation of air-injection pipe</u>: changed it from the side towards the end of reactor, what allowed a better H2S removal. (2)</i> - <i><u>Dry Biological Filter (DBF) disposition</u>: they were in parallel and are now ran in series. (3)</i> - <i><u>Pipe elevation</u>: (same as Izuan) (4)</i> - <i><u>Valve box</u>: better draining system into the box to avoid the box being full of water. It went back to TS and then to Engineering. (5)</i> - <i><u>POME dissolution</u>: In PLK, POME is very thick, and we apply water dissolution. Not has been standardized yet because depends on POME consistency. (6)</i> - <i><u>Recirculation pump inverter</u>: we installed an inverter to control the flow automatically (there was no flow-meter, meaning that we had to do a manual monitoring) (7)</i>
➔ <i>Pas facile car FMO n'existe que depuis deux ans. On recoit des feedback mais les grands changements ont été un commun accord. Les constatations proviennent tout autant des ingenieurs qui vont sur sites. FMO n'a pas cette tache explicite mais ils sont essentiels.</i> - <i><u>Air injection</u> : FMO a constate qu'il était preferable de placer a la sortie du reacteur</i> - <i><u>Agitation tuyauterie</u> : optimisation</i> - <i><u>Esthetique</u> : beaucoup d'amelioration</i>

- <u>Materiaux</u> : aspect qualite → diminution de cout car materiaux moins cher, automatisation, etc. - <u>Biological filters</u> : bcp de facteurs affecte la qualite de la bache. On revient a la couverture flexible mais il faut juste verifier la qualite du materiel, des filtre, etc. - <u>Pipe elevation</u> : aussi
- <u>Material Pipelines</u>: PVC is sensitive (cheaper but broke after a time), needed to change to HDPE. So decrease the OPEX. - <u>Suction points to the end only</u>: improved the quality (more methane and less H₂S) - <u>Gas mgmt.</u>: recirculation of 30% of the biogas (after filtered and cooling) allows to save energy and thus OPEX - <u>Slope of the pipelines</u>: was not steep enough. Avoid to have more civil work after commissioning. FMO should be incorporated into the design and the construction process. - <u>HDPE geomembrane rolling on the sides</u>: proposals has not been approved yet. Maybe we have to dig deeper. To avoid extra costs and accidents
- <u>Filtro biologico</u>: debatible - fue rigido al principio en Honduras pero se cambio por unas razones. Hay que ver eso con ingeniería. - <u>Relacion con cliente</u>: Pelakar tiene H₂S anormalmente alto. El efluente también tiene características particulares que no permite. PLK esta en una buena relación con Biotec por el dpto. de FMO. Le regalamos un filtro húmedo.
- FMO from BIA : - o Dilution POME in Pelakar (less H₂S) - <u>Operation global</u>: - o <u>Global Mise en place decanteurs</u>: premier projet, il n'y avait pas de sedimenteur - o <u>Repartition tuyauterie d'agitation</u>: - o <u>Taille des torchers</u>: - o <u>Tuyauterie annexe</u> : sortie de secours biogaz (encore en discussion niveau) - o <u>Accumulation d'eau sur la bache</u> : - o <u>Dimension des équipements</u> : (pompes, moteur, souffleries) redimensionner à cause de calculs trop conservateurs
- <u>Asia no saben</u> - <u>AMSA</u> : sistema de enfriamiento tipo laguna (5), alimentacion por bombeo (comportamiento) (3), homogenización de efluentes y biodigestion (4), comportamiento del filtro húmedo (1), conocimiento y manejo de diferentes usuarios dentro de una planta extractora (2), accesos tipo caminos (mejoras) (6)
➔ Proper collection of data: monthly report passed to Cali - Physical feature of the sites - 1) <u>Wet-filter functions</u>: helped a lot to reduce H₂S. There was no wet filter before until KPM and APM. We had O&M contract for two years. That allowed us to measure the effects of having those wet filters. - 2) <u>Relocation of agitation station</u>: before it was at the middle of the reactor but now it is placed at the end. It is not only due to FMO but from a team reflection.

2.4. Please categorize them according to the nature of the improvement

2.4.1. Optimization of CAPEX & OPEX

2.4.2. Improvement of KPI

2.4.3. Improvement of practical and aesthetics features

Improvement of KPI	Optimization of CAPEX & OPEX	Improvement of practical or aesthetics features
<i>Still need improvement for H2S filter and agitation system</i>	<i>Electrical and engine operation</i>	<i>Fiber use</i>
<i>Process know-how</i>	<i>Biological filters</i>	<i>Valve box</i>
<i>Electrical and Instrumentation</i>	<i>Sistema de enfriamiento tipo laguna</i>	<i>Accesos tipo caminos</i>
<i>Wet Biological Filter</i>	<i>Conocimiento y manejo de diferentes usuarios dentro de una planta extractora</i>	
<i>Reactor elevation</i>		
<i>Covering of wet and dry filters</i>		
<i>Biological filters</i>		
<i>Pipe elevation</i>		
<i>POME dissolution</i>		
<i>Relocation of air-engine pipe</i>		
<i>DBF disposition</i>		
<i>Comportamiento del filtro húmedo</i>		
<i>Homogenización de efluentes y biodigestion</i>		
<i>Sistema de enfriamiento tipo laguna</i>		
<i>Wet-filter functions</i>		
<i>Relocation of agitation station</i>		

3. Expenditure Strategies

3.1. Does FMO integration systematically impact CAPEX and/or OPEX reduction?

- <i>Yes for sure</i>
- <i>Nothing on CAPEX side</i> - <i>Definitely on OPEX</i>
- <i>Yes</i> - <i>FMO opinion is not taking into account regarding the costs. TS and Engineering are the ones taking decision and selecting materials, etc.</i> - <i>For project implementation, we need to test inoculation, etc. which is expensive. It would be cheaper to implement a small laboratory on field. It allows to reduce OPEX by increasing a bit the CAPEX</i>
- <i>Yes of course. Because they give us the car, so we know the performance of the car. So we can have feedback and transfer to TS. Direct contact with Engineering and R&D and FMO in Cali.</i> - <i>Depends on relationship and experience inside the company</i>
- <i>La logique voudrait que oui car FMO est le end user. Au final, ce sont les requirements du clients qui definiront les dépenses.</i>
- <i>Oui evident.. Oui dans un processus d'amélioration continu car il y aura toujours des cas spécifiques. Au bout d'un moment, plus besoin d'avoir ce feedback après 10-15 ans.</i>

- <i>Autre avantage strategique de FMO, permet de former les employes de biotec et le client.</i>
- <i>No hay mantenimiento en las plantas de BI</i>
- <i>Pero si el análisis de los datos puede impactar los costos</i>
- <i>El análisis de los datos de operación pueden ayudar a optimizar las unidades o disminuirlas</i>
- <i>los OPEX los maneja el cliente directamente</i>

4. Improvement of KPI

4.1. Does FMO integration systematically impact process KPI improvement?

<i>Yes clearly of course</i>
<i>YES – we measure everything that is performance related and get mgmt. level to agree with measurement criteria.</i>
<i>Yes strongly agree</i>
- <i>Yes</i> - <i>However process of established KPI could be improved. Engineering should imply FMO in the establishment of the KPIs. FMO should be implied in the proposal with the KPI promises.</i>
- <i>Oui bien sur, ce sont eux qui gerent les KPI</i>
- <i>The FMO is the chef. We can buy great ingredients but if we cannot cook, it won't be good meal.</i>
- <i>Oui</i>
- <i>Si el caso de filtro húmedo. Es un requerido por parte de los proveedores. Y fue la operación que nos permitió mejorar eso.</i>

5. Improvement of practical and aesthetics features of the plants

5.1. Does FMO integration systematically impact practical and aesthetics features of the plants?

6. Comments

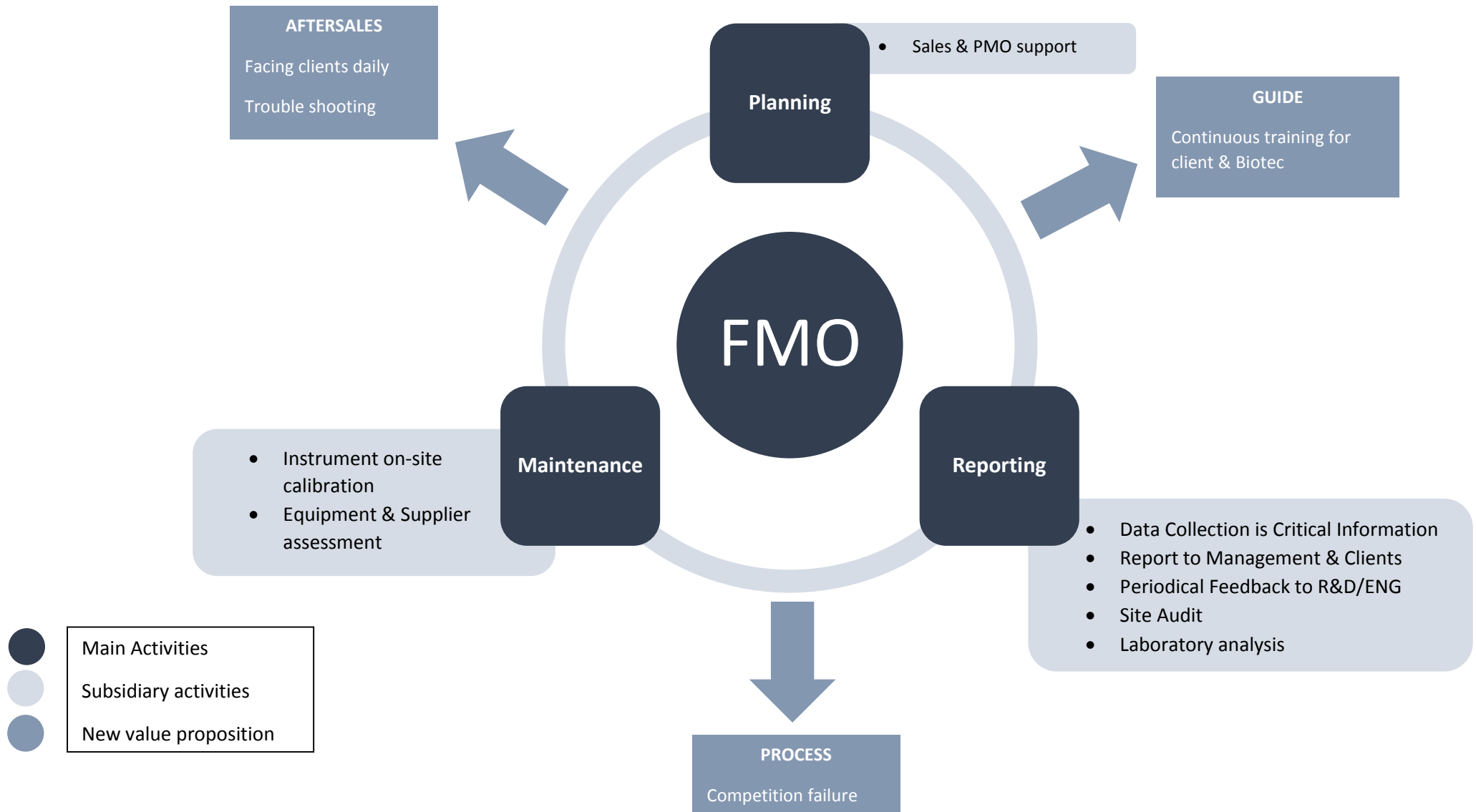
- <i>BIA is a lot better, and more organised than before.</i> - <i>FMO's operation should start during construction in itself. It would be better to step in during the design, etc. instead of after commissioning. TS should invite FMO during key meetings to have their views.</i>
- <i>We must have a proper guidelines or SOP to make sure that the process of continuous improvement could be done. Now, you report to TS or Engineering but you will face the same problem afterwards.</i> ○ <i>Implement a meeting with FMO, TS and quality. Send the minutes to engineering</i> ○ <i>...</i> - <i>We are not open to competitor's performance. We are focusing too much on our own business but don't know the offers of competition. Are we really biogas experts?</i>
- <i>FMO est un maillon important de la chaine ds le procesus et c'est le end-user. Toutes les autres entités attendent le feedback de FMO car c'est une source d'information importante. FMO est aussi la vitrine de l'entreprise. D'où l'importance de la qualite du staff, tenchiquem intelectuelm communciation, gestion KPIs, etc. C'est l'image de Biotec qui est derriere.</i>

-	<i>C'est donc un outil important pour commercial, pour ts comme feedback et pour ingnierie pour le feedback.</i>
-	<i>People on the sites (operators) don't have the sufficient knowledge and detailed experience about ferti-irrigation. They should because they are the ones interacting the most with the client</i>
-	<i>Make the plant clean, smart and beautiful. It affects a lot the image of Biotec</i>
-	<i>Interesting for me to go see the plant of Pelakar to speak with the operators.</i>
-	<i>Communication est un aspect crucial etre FMO et ingenierie. Cela sera en ameliorer avec microsoft 365. Important d'avoir les bons outils pour transmettre</i>
-	<i>Fue bueno el cuestionario, interesante.</i>
-	<i>3.1: torres de enfriamiento</i>
-	<i>3.2: related to PMO</i>
-	<i>3.3 En Honduras, permitio entender los bonos de carbono</i>
-	<i>3.5: Sobre todo para vender a un grupo industrial y mejorar el tiempo de negociación futuro</i>
-	<i>3.7: PMO related</i>
-	<i>3.8: Biopalma es un ejemplo que tuvimos gracias a FMO</i>
-	<i>3.9: R&D</i>
-	<i>3.10: Tea + intercambiador</i>
-	<i>3.12: no se ha dado pero tiene potencial</i>
-	<i>3.13: TVA + Muy buen ejemplo con un proveedor de accesorios PVC para válvulas</i>
-	<i>3.14: Servicio de postventa permite evaluarlos</i>
-	<i>3.15: Entregamos ingeniería con unas especificaciones</i>
-	<i>3.17: Ever Funes e Izuan Ahmad</i>
-	<i>4.2: Operadores de plantas de biogás y no de producción eléctrica</i>
-	<i>Los operadores aprenden con el tiempo</i>
-	<i>Kompro sabe mejor que nosotros. Así que sería mejor integrarlos internamente.</i>
-	<i>Calderas: no es experto Biotec en calderas. Teníamos una alianza en honduras para eso.</i>
-	<i>4.3:</i>
-	<i>Garantizar lo que hemos prometido. Not improve but to guarantee</i>
-	<i>4.8:</i>
-	<i>Nunca lo medimos pero esta ligado al DQO</i>
-	<i>4.10:</i>
-	<i>Actualmente esta en area de I&D mas que FMO</i>
-	<i>FMO is a technical support to the sales. They always join the sales team for exhibitions, sites visits, meetings with potential clients.</i>
-	<i>FMO is also after sales</i>
-	<i>We have internal knowledge sharing between each dpt. We have discussions, trainings, etc. But no SOP, however, pwp are shared through 365 (public, presentations or event).</i>

Correlation between FMO and Business Performance indicators



Appendix 7: New Value Propositions Facility Management Office



Appendix 8: Profitability analysis

General hypothesis			Notes
1	Month of Implementation phase	12	The organizational learning recommendations are based on a one year implementation phase. The expenditures strictly linked to this implementation phase are considered as CAPEX
2	Business days per year	250	Considering the international aspect of the company, it is assumed that there are approximately 250 business day in a year
3	Business hours per day	8	According to the Forty-Hour Week Convention (international labor organization, 1935)
4	Average cost per man-day (USD)	115	This cost is an average of all the members of the organization. The average cost of labor per man-day is assumed to be similar in every execution unit
5	Conversion rate MYR to USD	0.23	The prices are converted to USD based on the currency rate at 18th of December 2015
6	Total FTE group	90	The total amount of people working full time in the organization
7	Average cost per man-year (USD)	10,350	According to Business Plan (2015-2019)
8	Total FTE BIA (2016)	47	
9	Total FTE BIA (2017)	62	
10	Total FTE BIA (2018)	83	
11	Total FTE BIA (2019)	107	

Cost projection									
Recommendation	Definition	Hypothesis		Capex USD 2016	Opex USD 2016	Opex USD 2017	Opex USD 2018	Opex USD 2019	Comment
Champions	Champions are members working actively at the	Number of Champions for BIC allocated to BIA (FTE)	0.5		57500				

	promotion of Organizational Learning during the implementation phase	Number of Champions for BIA (FTE)	0.5						
		Cost of a middle manager per man-day (RYM)	1,000						
Expert	Subject Matter Experts continuous dedication of working hours for knowledge sharing	Proportion of working time required for knowledge sharing	0.05		67563	89125	119313	153813	120 minutes/week (applicable for everyone)
Knowledge fair	Semestrial half day event per business unit to encourage learning culture	Total of FTE in BIA	38		5164	6371	8062	9994	
		Cost of logistics per event (MYR)	3000						
Training	Training session for new system and tools implementation	Already in cost of 365 implementation	0	0					
			0						
Group Meeting	Communities of practice and interest	Hours of meeting per trimester	1		3784	4491	6682	8614	
Learn from mistakes	Several processes of action learning	Number of AAR per year per department	12		51008	55058	60728	67208	
		Number of persons implied in a project	4						

Appendix 9: Calculation of the discount rate

Overall return on investment varies depending on location, specific technology, local energy market, feedstock quality and consistency, tipping fees and government financial incentives. However, in order to calculate the Discount Rate applicable to Biotec, the formula's chosen were the following (KPMG, 2014 and Equity Market Risk Premium Research, 2014):

- $k = r_{fr} + \beta \times MRP + \alpha$

$$K = 3.86 + (0.81 \times 4) + 4 + 2.85 = 13.72\% = +/-14\%$$

1. **Rfr and MRP:** the estimates are based on a rounded estimate of the highest value of Malaysian Markets or American Markets (S&P 500) (Market Risk Premia, 2015) & (KPMG, 2014)

- $r_{fr} = 3.86\%$ similar to yield on long term government bond USA 20 years
- $MRP = 4\%$ for the USA. The USA implied risk premium is selected¹

2. **Beta**

β = industry risk factor (unlevered) (NYU Stern, 2015)

The beta is based on the average between the « green and renewable industry » and the « environment and waste services industry »

Beta (β)	
Green and renewable energy	0.68
Environment and waste services	0.94
Average	0.81

We notice the industry that Biotec is part of is less risky and has therefore a lower Beta than the market. This is most likely because its products and services development is only partially correlated to economics cycle.

3. **Alfa**

The Alfa is the company specific additional risk premium. It is linked mainly to the size and the country risk.

α = company size and emerging country risks

- Company size: the additional premium to take into account the company small size is 4%. This ratio is based on a review of commonly adopted risk premium size for small companies ranging between 3% and 5%.
- Emerging country risk: first, the corporate entity will be based in a well-developed financial market such as Hong Kong, Singapore, USA (Miami), Malaysia, or Panama. The country risk linked to these markets are relatively low.

¹ Another source indicates for Malaysia a rate of 2.25% (implied risk premium). However, this one has not been taken for conservative reasons.

Moody's rating		
Country	Rating grade	Significance
Honk Kong	Aa1	High grade
Singapore	Aaa	Prime
USA	Aaa	Prime
Malaysia	A3	Upper medium grade
Panama	Baa2	Lower medium grade

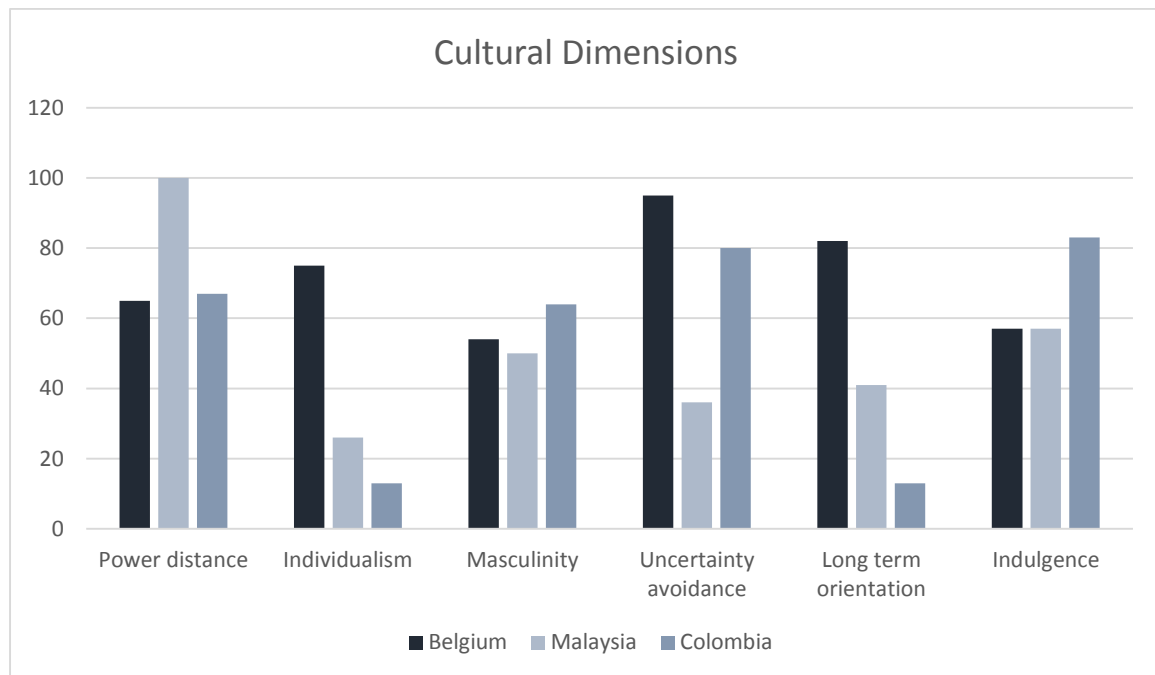
As the Malaysian MRP indicates, in this post crisis period, the implied risk premium seems currently lower than in the USA. Therefore corrections to the risk premium linked to the country where the corporate entity will be established is no longer deemed necessary with the possible exception of Panama.

So the additional risk premium would result from the fact that the corporation would have most of its business in a portfolio of slightly more risky emerging countries. Even if this might be true for some segments of the portfolio (particularly in Africa) most of the business will be carried in countries with a risk that is no longer very high. The rating for Colombia for instance is Baa2.

That of Indonesia is Baa3. In addition, the diversification of the Biotec client portfolio decreases this risk significantly as Biotec can switch its growth from one country to another one based on their economic fluctuations and as the country diversification itself significantly lowers the risk.

For conservative reasons however, the country risk premium – 2.85% - of Colombia where most of the engineers are located has been added.

Appendix 10: Hofstede Cultural Dimension



Hofstede cultural dimensions (Hofstede, 2015)