Is agro-tourism eco-friendly?

Ramona Giurea[1,*], *Marco* Ragazzi[2], *Moise Ioan* Achim[3], and *Mihai-Victor* Zerbes[4]

[1] Department Engineering and Management, Lucian Blaga University of Sibiu, 550024, Sibiu, Romania & Department of Civil Environmental and Mechanical Engineering, University of Trento, 38123, Trento, Italy
[2] Department of Civil Environmental and Mechanical Engineering, University of Trento, 38123, Trento, Italy
[3] Department of Exact Sciences and Engineering, "1 Decembrie 1918" University of Alba Iulia, 510009, Alba Iulia, Romania
[4] Department Engineering and Management, Lucian Blaga University of Sibiu, 550024, Sibiu, Romania

Abstract. The paper will highlight the impact of agro-tourism on environment in Romania, focusing on the Sibiu County. Thanks to the results obtained from this analysis, research and information collection, the paper will give some answers regarding the question: are agro-tourisms environmentally friendly? The authors identify potential causes of environmental pollution from agro-tourism and some resources that could be economically used. The negative and positive aspects on the increase of agro-tourism activities in the proposed region will be also discussed taking into account there impact on the environment. Based on the obtained results, the authors will propose a method for the management of resources in order to arrive to an eco-friendly system for the proposed case-study. Future developments and applications on other EU case-study will be also discussed in this paper.

1 European framework on environment

The fundamental of our health, our economy and our well-being is the environmental quality. Nevertheless, it faces several serious challenges as climate change, unsustainable consumption and production, as well as various forms of pollution [1-3]. A part of this pollution is also connected with the agro-tourism production and consumption: wastewater, solid waste, energy consumption, etc. [4,5]

The concern for environmental protection appeared on the European Agenda in the early 1970s [6]. Environmental policy of the European Union (EU) was created by the Treaty of the European Community with the aims to ensure sustainable environmental protection measures. The Treaty of Maastricht (1993) made the environment an official EU policy area [7]. Over the past decades, the EU has put in place a broad range of environmental legislation through Environment Action Programme (EAP) that sets out priority objectives as: the protection of nature, stronger ecological resilience,

* Corresponding author: ramona.giurea@ulbsibiu.ro

sustainable, resource-efficient and low-carbon growth; and the fight against environment-related threats to health [8].

In Romania, after the communist period (1989), began a long process of social, political and economic transformation, whose essence lies in the transition from a planned economy to a free market. So by Government Decision the Ministry of the Environment was established – a state controlled authority, which organizes the institutional framework, develop, guide and improves environmental activities on a national scale [9]. The main areas of expertise of Ministry of Environment are: air quality and environmental noise, management of protected areas, environmental infrastructure, waste management, sustainable development, climatic changes, water management, forestry sector management, etc [10].

The European Union has some of the world's highest environmental standards, developed over decades. Environment policy helps the EU economy become more environmentally friendly, protects Europe's natural resources, and safeguards the health and wellbeing of people living in the EU. The EU environment policy is based on Articles 11 and 191-193 of the Treaty on the Functioning of the European Union [11].

Apart from demands required at European and national level, there are a range of international standards adopted by European Union and implicitly of Romania. The principal standard in Romania is Environment ISO 14001 and in Europe EU Eco-Management and Audit Scheme (EMAS) [12-13].

Tourism plays a major role in the EU economy. According to the European Commission, it is the third largest socio-economic activity in the EU [14]. In the scientific literature we can find the term agro-tourism defined as a subset of rural tourism [15], having the roots on the use of the resources from the rural regions [16-17]. However, rural tourism is an intricate and extended phenomenon and the effect is directly proportional with each individual territory and the relationships between tourism products and local resources [18]. Agro-tourism includes various tourist activities, such as accommodation (bed and breakfast, rural lodgings, farm campsite); catering (evening meals); leisure activities (pedagogical farms, sports, horse-riding, farm visits) [19].

The existences of an economic interest and social benefits of agro-tourism is increasing [20-21], specific literature has considerable gaps in which concern environmental consequences [22-23], those gaps being a considerable opportunities to improve the specific processes of the field. Starting in the context of environmental actions, based on analysis, mainly case studies, we can observe that the agro-tourism can produce both positive and negative effects on the environment; for example, some positive effects on environment are: water and energy resources, landscape, biodiversity, reduced use of fertilizers and pesticides in productive processes and improvement of the quality of foods [24].

2 Proposed methodology

The methodology used in this article by the authors is inspired from the DMAIC model used by organizations in the six-sigma projects [25]. The overall methodology of the study (Fig. 1, Fig. 2) is detailed explained in an article [26], concerning "*The modelling of the improving environmental aspects process and of the associated impacts in industrial organizations*" which illustrates the key steps carried out in the model building.

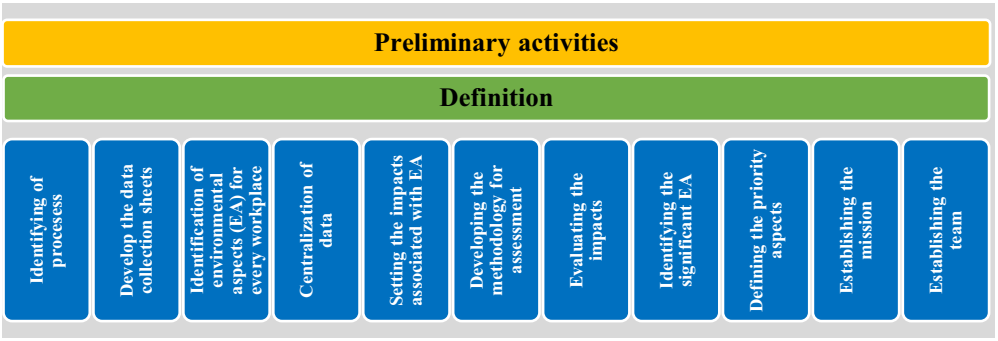

Fig. 1. Phase of the propose DMAIC model – Preliminary activities

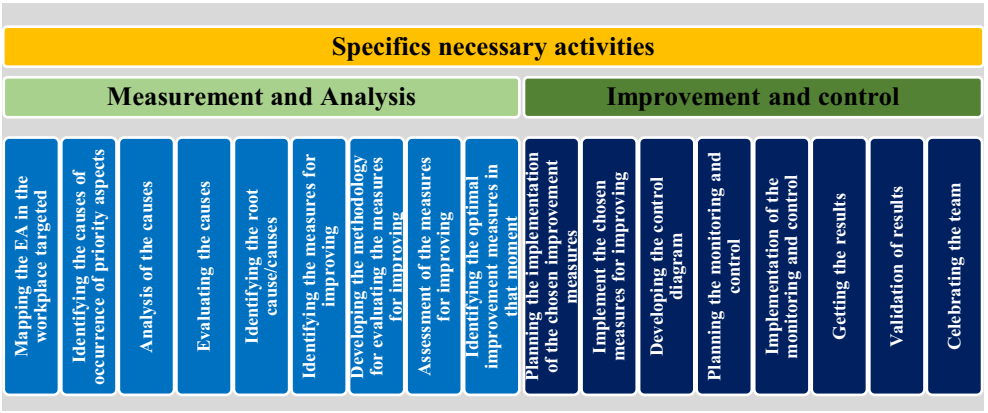

Fig. 2. Phases of the propose DMAIC model - Specifics necessary activities

For implementing the proposed model, the authors took into account the main activities in an agro-touristic structures, summarized in Table 1.

Table 1. Main processes in an agro-touristic structure

Process		Included activities		Input	Output	Code
Name	**Code**	**Name**	**Code**			
Transport	T	Gas supply	**gs**	Gas	Fuelled automobile	TGF
		Carrying out documents	**cd**	Documents	Documents completed	TDD
		Transport	**tr**	Gas	Transportation	TGT
		Maintenance	**me**	Documents, Inspect. equipment	Automobile maintained	TIA
Check in/out	C	Carrying out documents	**cd**	Personal documents. Specific formulation	Check in/out	CPC
		Delivery keys	**dk**	Keys	Check in/out	CKC
Accommodation	A	Takeover room	**tr**	Check in	Check out	ACC
Meal	M	Meal preparation	**mp**	Equipment and products	Food prepared	MEF
		Serving food	**sf**	Meal prepared	Meal served	MPS
		Cleaning table	**dm**	Disposal meals	Release tables	MDR
		Cleaning dishes	**cm**	Dirty dishes	Clean dishes	MDC
Leisure activities	L	Hike	**hk**	Transport	Visit	LTV
		Equipment	**ha**	Equipment	Household cared	LEH
Hygiene/ cleaning	H	Common space	**cs**	Equipment and cleaning solutions	Common space cleaned	HEC
		Kitchen and bathrooms	**kb**	Equipment and cleaning solutions	Kitchen and bathrooms cleaned	HEK

Process		Included activities		Input	Output	Code
Name	**Code**	**Name**	**Code**			
		Guest rooms	**gr**	Equipment and cleaning solutions	Guest rooms cleaned	HEG
		Household	**hh**	Equipment and cleaning solutions	Household cleaned	HEH
Acquisition/ purchases	P	Analysis and drafting documents	**ad**	Documents	Documents completed	PDD
		Transport	**tt**	Gas	Transportation	PGD
		Reception	**re**	Documents	Documents completed, Product reception	PDP
		Storage	**st**	Documents	Storage products	PDS
Maintenance work	W	Maintenance equipment	**me**	Documents, Inspection equipment	Equipment maintained	MDE
		Automobile	**at**	Documents, Inspection equipment	Automobile maintained	MDA
		Equipment and installations household	**ei**	Documents, Inspection equipment	Equipment and installations maintained	MDI
Agriculture/ farming	F	Mechanized works	**mw**	Specific equipment	Tillage	FST
		Manual/handiwork works	**mh**	Specific equipment	Tillage	FSH
Zootechnics	Z	Caring	**ca**	Specific equipment	Groomed animals	ZSG
		Feeding	**fe**	Specific equipment	Fed up animals	ZSF
		Slaughtering	**sl**	Specific equipment	Meat, fur	ZSM
Pomiculture	P	Other manual works	**om**	Specific equipment	Fruit growing	PSF
		Spraying	**sp**	Specific equipment	Splash trees	PSS
		Pruning work	**pw**	Specific equipment	Fruit growing	PSP

To achieve the objective of this research, the authors, firstly, focused on identifying the main environmental aspects and impacts associated with them. In this way, the data about the identification and analysis of the aspects are highlighted in Table 2.

Table 2. Identification of environmental aspects and their impacts assessment

Process	Included activities	Input/ Output	Environment aspect	OC *	EI	Impact assessment					Impact classification	
						L	F	N	C	TS	I	S
T	**gs**	TGF	Exhaust emissions	N	AP	5	3	1	3	45	**I**	-
	cd	TDD	Waste paper	N	SP	3	5	1	1	15	**I**	-
	tr	TGT	Exhaust emissions	N	AP	3	3	1	3	27	**I**	-
	me	TIA	Waste paper	N	SP	3	1	3	3	27	**I**	-
C	**cd**	CPC	Waste paper	N	AP, SP	3	5	1	3	45	**I**	-
	dk	CKC	Waste paper	N	AP, SP	3	5	1	3	45	**I**	-
A	**tr**	ACC	Waste paper, organic paper	N	AP, SP	1	5	3	3	45	**I**	-
M	**mp**	MEF	Organic waste	N	SP, WP	3	5	1	5	75	-	**S**
	sf	MPS	Organic waste	N	SP, WP	3	3	3	1	27	**I**	-
	dm	MDR	Organic waste	N	SP, WP	3	3	3	1	27	**I**	-
	cm	MDC	Organic, chemical waste	N	AP, SP, WP	3	3	1	3	27	**I**	-
L	**hk**	LTV	Exhaust emissions	N	AP	5	3	3	1	45	**I**	-
	ha	LEH	Organic, paper waste	N	SP, WP	5	3	1	1	15	**I**	-
H	**cs**	HEC	Chemical waste	N	AP, SP, W	1	3	5	3	45	**I**	-
	kb	HEK	Chemical waste	N	AP, SP, WP	1	3	5	3	45	**I**	-

Process	Included activities	Input/ Output	Environment aspect	OC *	EI	Impact assessment					Impact classification	
						L	F	N	C	TS	I	S
	gr	HEG	Chemical waste	N	AP, SP, WP	1	3	5	3	45	**I**	-
	hh	HEH	Organic, chemical waste	N	AP, SP, WP	5	3	3	1	45	**I**	-
P	**ad**	PDD	Paper waste	N	SP, WP	3	3	1	1	9	**I**	-
	tt	PGD	Exhaust emissions	N	AP, SP, WP	3	1	3	3	27	**I**	-
	re	PDP	Paper waste	N	SP, WP	3	3	1	1	9	**I**	-
	st	PDS	Organic, Paper waste	N	SP, WP	3	3	1	3	27	**I**	-
W	**me**	MDE	Paper waste	N	SP, WP	3	1	1		3	**I**	-
	at	MDA	Paper waste,	N	SP, WP	3	1	3		9	**I**	-
	ei	MDI	Paper waste, electronics and electrical waste	N	AP, SP, WP	5	1	3		15	**I**	-
F	**mw**	FST	Organic waste	N	SP, WP	3	3	5	3	135	-	**S**
	mh	FSH	Organic waste	N	SP, WP	3	3	5	3	135	-	**S**
Z	**ca**	ZSG	Organic waste	N	SP, WP	3	3	1	5	45	**I**	-
	fe	ZSF	Organic waste	N	SP, WP	3	3	1	5	45	**I**	-
	sl	ZSM	Organic waste	N	SP, WP	3	3	1	5	45	**I**	-
P	**om**	PSF	Organic waste	N	SP, WP	3	3	1	5	45	**I**	-
	sp	PSS	Organic waste	N	SP, WP	3	3	1	5	45	**I**	-
	pw	PSP	Organic waste	N	SP, WP	3	5	1	5	75	-	**S**

Legend: WP-water pollution; AP-air pollution; SP-sol pollution; OC-Operating condition; EI-Environment impact; L-Existing of the legal requirements and other environmental requirements regulating environmental impact; F-Frequency of occurring environmental impact; N-The nature of the natural resource/the pollutant /the waste to which it relates those impacts; C-Data on the amount of natural resource/pollutant /waste implied by those impacts; I-Insignificant; S-Significant

The values obtained in Table 2 were analysed using Pareto diagram as follows:

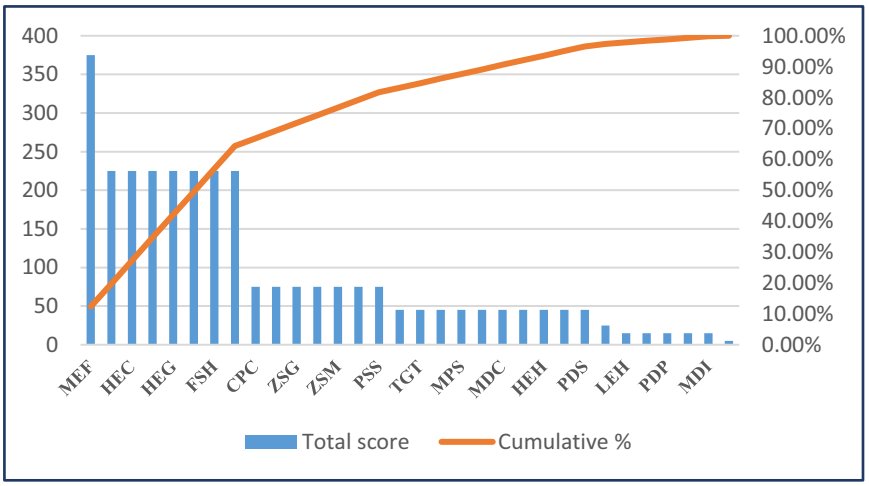

Fig. 4. Overview on analysed values by the instrumentality of Pareto diagram

As can be seen in this chart, 25% of cases generate about 70% of the problem. To illustrate how these cases are approached further, below we present the analysis of the first three causes. Therefore, were identified alternative amelioration presented in Table 3.

Table 3. Identification of alternatives for the top three causes

Cause	Alternative 1	Alternative 2	Alternative 3
MFE Meal preparation Equipment and products Food prepared	Outsourcing services through catering	Removal of the meal by providing the kitchen. The tourist will prepare his own meal	Increasing the consumption of their own products by prohibiting the consumption of products from outside the agro-touristic structure
ACC Takeover room Check in Check out	Creating a special zone for selective collection of waste in agro-touristic structures	Creating a special zone, serving the meal in agro-touristic structures	Optimizing water consumption and electricity by implementing sensors for light and water
HEC Equipment and cleaning solutions Common space cleaned	Acquisition of eco cleaning products	Some alert rules for dirty clothes through posters with environmental protection	Outsourcing services through specialized firms. Traditional cleaning

The alternatives identified will be evaluated using matrix for selecting the alternatives. To apply this tool is necessary to define a number of criteria as below.

The evaluation criteria previously developed alternatives are: a. total cost; b. impact on the problem; c. relation The cost / benefits; d. resistance / impact to change; e. time of implementation; f. the uncertainty about the effectiveness.

To evaluate alternatives to improve relative to these criteria the authors used as an instrument of quality matrix (Table 3) for selecting the alternatives where used the following notations: 3 - very favourable impact; 2 - medium favourable impact; 1 - weak favourable impact.

Table 4. The matrix for selecting the alternatives

Cause	Alternative for improving	Criteria selection						Total
		a	b	c	d	e	f	
MFE Meal preparation Equipment and products Food prepared	Outsourcing services through catering	2	3	2	2	3	1	14
	Removal of the meal by providing the kitchen The tourist will prepare his own meal	3	1	2	2	2	3	13
	Increasing the consumption of their own products by prohibiting the consumption of products from outside the agro-touristic structure	**2**	**3**	**2**	**3**	**3**	**2**	**15**
ACC Takeover room Check in Check out	Creating a special zone for selective collection of waste in agro-touristic structures	2	3	2	2	3	1	14
	Controlling serving the meal in the room by creating a special zone	2	2	3	2	2	1	12
	Optimizing water consumption and electricity by implementing sensors for light and water	**1**	**3**	**3**	**3**	**2**	**1**	**13**
HEC Equipment and cleaning solutions Common space cleaned	Acquisition of eco cleaning products	1	3	2	3	2	1	12
	Some alert rules for dirty clothes through posters with environmental protection	**3**	**2**	**3**	**3**	**2**	**2**	**15**
	Outsourcing services through specialized firms	2	3	2	3	2	1	13

After identifying suitable options, using matrix for selecting the alternatives, a plan of measures will be developed to improve compliance with the requirements of Table 5.

Table 5. Plan of measures to improve compliance

No.	Cause	Corrective action	Resources needed	Responsible	Term
1.	MFE Meal preparation Equipment and products Food prepared	Increasing the consumption of their own products by prohibiting the consumption of products from outside the agro-touristic structure	M: preparing from the own products U: The chef	The owner	**Daily**
2.	ACC Takeover room Check in Check out	Optimizing water consumption and electricity by implementing sensors for light and water	M: sensors for light and water U: the electrician, the plumber	The owner	**2 month**
3.	HEC Equipment and cleaning solutions Common space cleaned	Some alert rules for dirty clothes through posters with environmental protection	M: posters with environmental protection U: the staff	The owner	**1 day**

Legend: M – material resources, U – humane resource

With the control elements we have to ensure that corrective actions planned are used and maintained as required in Table 6, highlighting those items graphed control.

Table 6. Corrective actions planned

Variable	Increasing the consumption of their own products by prohibiting the consumption of products from outside the agro-touristic structure	Optimizing water consumption and electricity by implementing sensors for light and water	Some alert rules for dirty clothes through posters with environmental protection
How to measure	Tracking stock	Tracking consumption	Visual
Were	Storage area	At the electric and water counter	Rooms
Reference	Sheet Storage	The bill	The amount of washing
Who measures	The chef	The owner	The staff
Who decides	The chef	The owner	The owner
What makes	Remake stock	Checking the sensors	Checking the posters
Who checks	The owner	The owner	The staff
Frequency	Dailey	Monthly	Dailey
Were records	Register	Register	Register

3 Conclusions

In order to comply with the international environment requirements, the authors recommend that SMEs in the agro-tourism sector also, to assume the techniques, tools and modern methods of control, monitoring and improvement of environmental aspects. In this context the authors presented in the present paper a conceptual model that is meant to facilitate the purpose defined in the paper title.

Currently, there are numerous studies, research and methodologies that consecrate optimally chosen can contribute to achieving specific environmental objectives. For example, to establish the strategy to improve the waste can use other tools and methodologies from other fields. In this paper the authors attempted to clarify the relationship between the agro-tourism activities and environment. The extent to which succeeded this, it is up to the potential users of the model [27].

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