Risk factors of dropping literacy programs: Learning decision tree, applied to Moroccan individual data

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Introduction

In Morocco by the end of 1980, literacy actions of the population were one of privilege axes of social policy. Many progresses have been accomplished. The number of the program subscribers has been raised very substantially thanks to diversificationof the offer moving by the end of 1990 from 100000 subscribers to more than 700000 subscribers in last years(table 1)

Table 1: subscribers evolution numbers between 2003 and 2011

Program	2003-2004	2004-2005	2005-2006	2006-2007	2007-2008	2008-2009	2009-2010	2010-2011	2011-2012
Total	450 335	469 206	655 478	709 155	651 263	656 307	706 394	702 119	735 062

Source: the direction reports of the campagne against illiteracy (DRCAI)

Since 2007, Literacy of public action knew an outside dynamic thanks to the financial and technical support of the international cooperation. The direction campaign against illiteracy (DRCAI) has elaborated a new action plan 2013-2016 aiming to get illiteracy rate less than 20% in the horizon of 2016 and to raise capacity intervention to 1 million beneficiaries per year .The advanced accesses have been completed by a proactive policy to guarantee educative quality service .

The access itself is not an end.Generalization of the access is not a necessary condition to make challenge. In a total of 1619 beneficiaries enrolled and followed in Marrakech, only 997 completed the cycle. The dropout rate is 39%. For us, this rate is very challenging. The number of recorded abandonment is divided between 22.6% in the first phase of the program (before the test 2) and 17% in the second phase of the program (between the second and third test). The overall improvement of literacy policy, whose resources are limited, requires rationalization. This article is based on the exploitation of an original / unique database that tracks a cohort of beneficiaries throughout the process of literacy. This paper aims to analyze the risk factors associated with dropping literacy programs for adult women. In the context of this article, we will be limited to female beneficiaries, since the proportion of women in our sample exceeds 93%. Compared to the Moroccan context, this work presents a double interest: Methodologically: This contribution is, to our knowledge, the first application of the micro-econometric approach to Moroccan data; analytically: the results of this should guide public actions and measures to improving the efficiency and quality of the school system, including primary education reading.

The remainder of this paper is structured as follows. The second section presents the profile of the abandoned programs population. The second analysis the determinant of abandons. The policy implications are presented as concluding remarks.

2. The profile of the beneficiaries who abandoned the programs
2.1. Data
The data used in this paper has two characteristics:
- The longitudinal dimension: The survey is to track a representative sample of the cohort of beneficiaries enrolled in literacy programs under the 2007-2008 campaign in the territory of delegation of the Ministry of Education in Marrakech . The initial sample includes 1619 people. The sampling frame is made of literacy classes per operator which are available from the Delegation of MEN. The sample includes the 4 types of programs / operators (general program, public operators, NGOs and private sector).
The data collection protocol comprises the following activities:
•awarding a measurement proficiency test three times the literacy process (at the beginning, in the middle and at the end)
•collecting socio-demographic data on the beneficiary;
-the dimension of direct measure: the measurement of acquired knowledge and its sustainability is based on the direct method. Beneficiaries are subject to three times direct assessment test that is based on the methodology adopted in international surveys to measure levels of literacy(OECD, 1994, 2000). The geographic scope of the study concerned the province of Marrakech-Menara. This province is home to all kinds of programs and presents a large socioeconomic variety (urban area, rural area).

2.2: Characteristics of the sample
The sample is composed of 93% of female beneficiaries. Literacy programs are primarily located in urban areas (Almost three quarter of beneficiaries live in urban areas and only 18.1% of the beneficiaries are located in rural areas). Almost 8 out of 10 beneficiaries are inactive. Married beneficiaries are the majority (60%). Almost 6 out of 10 beneficiaries have at least one reliant child. About 27 % of beneficiaries speakAmazighi as a mother tongue. A

significant proportion of the beneficiaries are not first time applicants for literacy programs. More than 25% of the beneficiaries report have previously registered in a literacy program. The registering motivations cited by beneficiaries are related to personal growth (85.8%) and religious reasons (38.2%).

The beneficiaries of literacy programs are registered in four different programs (the general program (25.4%), the public operators program(31.9%), the NGO program(35.5%), and the private operators Program(7.2%).

Table 2: Sample Description

		Number	%
Program in which the beneficiary is enrolled	general program	412	25,4
	public operators	516	31,9
	NGO	575	35,5
	private operators	116	7,2
	Total	1619	100
sex of the beneficiary	Male	107	6,6
	female	1512	93,4
	Total	1619	100
place of residence, the beneficiary	rural	293	18,1
	urban	1217	75,2
	Suburban	109	6,7
	Total	1619	100
	Total	1619	100

2.3 The profile of the abandoned beneficiaries

Registration to literacy programs does not necessarily lead to its completion. Indeed, only 977 out of the 1619 recipients completed the program, which means 60.3% of the total sample. 22.6% dropped out midway courses while 17% dropped out at the end of the program.

Table 3: Type of abandonment of literacy programs

		Number	%
Drop out level	Completed the program	977	60,3
	Mid-term abandonment	366	22,6
	Abandoned at the end of program	276	17
	Total	1619	100

The level of abandonment of literacy programs depends on the type of the program the beneficiary is enrolled. Indeed, they are 40.3% who abandoned the general program, 38.8% abandoned the program of public operators, 38.3% abandoned the NGO program then almost 50% abandons the programs provided by private operators (Table 4).

Table 4:Dropout ratesaccording to the type of literacy program

		program in which the beneficiary is enrolled				
		General Program	public operators	NGO	private operators	Total
leave	0					
	Effective	246	316	355	60	977
	% Included leaving	0,252	0,323	0,363	0,061	1
	% Included in the program in which the beneficiary is enrolled	0,597	0,612	0,617	0,517	0,603
	1					
	Effective	166	200	220	56	642
	% Included in leaving	0,259	0,312	0,343	0,087	1
	% Included in the program in which the beneficiary is enrolled	0,403	0,388	0,383	0,483	0,397
Total	Effective	412	516	575	116	1619
	% Included in leaving	0,254	0,319	0,355	0,072	1
	% Included in the program in which the beneficiary is enrolled	1	1	1	1	1

Note: The value of chi-square test of dependenceis rejected

The dropout rates of literacy programs depend not only on the type of the program in which the beneficiary is enrolled but also on the place of his or her residence.Accordingly, slightly more than 55% of beneficiaries who live in suburban areas have abandoned the program. Nearly four out of ten of the recipients abandon the urban program and only one third abandon the rural one.

Table 5: Dropout rates according to the place of residence

			area of residence of beneficiary			
			rural	urban	suburban	Total
Leave	0	Effective	193	735	49	977
		% Included leaving	0,198	0,752	0,05	1
		% included in the beneficiary's area of residence	0,659	0,604	0,45	0,603
	1	Effective	100	482	60	642
		% Included leaving	0,156	0,751	0,093	1
		% included in the beneficiary's area of residence	0,341	0,396	0,55	0,397
Total		Effective	293	1217	109	1619
		% Included leaving	0,181	0,752	0,067	1
		% included in the beneficiary's area of residence	1	1	1	1

Chi-square test ofdependence, the value 14.529 is accepted

The Table 6 below reports the distribution of the dropouts of literacy programs according to their family status of the beneficiaries. The highest dropout rate is observed among divorced (61.9%), followed by single recipients (42.4%) and married ones (37.9%). The drop out phenomenon of the literacy programs is less recorded among widowed.

Table 6: Dropout rates according to the beneficiary's family status

			family situation of the beneficiary				
			married	Single	widowed	divorced	Total
leave	,00	Effective	596	278	87	16	977
		% Included leaving	61,0%	28,5%	8,9%	1,6%	100,0%
		% included in the beneficiary's family situation	62,1%	57,6%	64,4%	38,1%	60,3%
	1,00	Effective	363	205	48	26	642
		% Included leaving	56,5%	31,9%	7,5%	4,0%	100,0%
		% included in the beneficiary's family situation	37,9%	42,4%	35,6%	61,9%	39,7%
Total		Effective	959	483	135	42	1619
		% Included leaving	59,2%	29,8%	8,3%	2,6%	100,0%
		% included in the beneficiary's family situation	100,0%	100,0%	100,0%	100,0%	100,0%

Chi-square test of dependence, the value 12, 509 is accepted

The gender of the trainer may explain the dropout rates of the literacy programs. Indeed, the Table 7 shows that the abandonment of literacy programs is very high when the trainer is female (65.3%) while it is just 34.7% when the trainer is a man.

Table 7: dropout rates according to the trainer's gender

			Trainer Gender		
			male	female	Total
Leave	,00	Effective	409	568	977
		% Included leaving	41,9%	58,1%	100,0%
		% Included in Trainer Gender	64,7%	57,5%	60,3%
	1,00	Effective	223	419	642
		% Included leaving	34,7%	65,3%	100,0%
		% Included in Trainer Gender	35,3%	42,5%	39,7%
Total		Effective	632	987	1619
		% Included leaving	39,0%	61,0%	100,0%
		% Included in Trainer Gender	100,0%	100,0%	100,0%

Chi-square test of dependence, the value 8, 27,529 is accepted

3. The risk factors for dropping out of literacy programs

3.1 Methodology

To identify risk factors for dropping out, this article proposes tree models to classify beneficiaries in groups identified by specific characteristics. Three components were identified: one related to the recipient (age, family situation ...) that related to the selected program and the related training requirements (trainer ...). At each step, the method CHAID (Chi-squared Automatic Interaction Detection.) retained to choose the risk factor interaction where the dependent variable is the strongest. Four indicators are used to assess the quality of the model: Tables providing information on the model, a tree diagram; diagrams providing information on the performance of the model; forecasting model variables some added to the active dataset.

3.2 Empirical Results

Table 8: Summary of CHAID model

Specifications	Method Development	CHAID
	dependant Variable	Abandoning the literacy program
	Independent variables	Program in which the beneficiary is registered, Note Initial test, recipient age, recipient resides environment, previous education of the beneficiary, the beneficiary mother tongue, trainer of Gender, Age trainer, Single
Results	Independent variables included	Note Initial test, trainer of Gender, Mother Tongue Recipient
	Number of nodes	7
	Number of terminal nodes	4
	depth	3

The total number of nodes is 7 with 4 terminal nodes. The number of levels below the root node is 3 (the depth of the tree). Only three factors are included in the final model. It acted the recipient of the score in the first test, the type of trainer and mother tongue of the recipient (see the tree).

Graphic: Tree Diagram of dropout literacy programs

The tree show that the risk of dropping literacy programs are:

¬ The level of the beneficiary to the initial test. Registered with zero level of elevated risk. ¬To register who achieved a score more than weak, having a male trainer is the sole determinant as no node appears under this element, it is considered a terminal node.

¬ For listed as having a low level with a female teacher, mother tongue is a determinant.

Most of the main features of tree diagram are summarized in the tree table (see table 9). The information is displayed for each node:

Table 9: Tree Table

Nods	Primary independent variable			
	Variable	Sig.a	Khi-deux	Valeurs de scission
0				
1	Note Initial test	****	15,461	<= 2,420 (Nul)
2	Note Initial test	****	15,461	> 2,420
3	Trainer Gender	****	6,268	female
4	Trainer Gender	****	6,268	male
5	mother tongue of the beneficiary	****	5,321	tree
6	mother tongue of the beneficiary	****	5,321	amazigh

To analyze the quality of the model, we use the earnings charts and indexes that indicate that the model is good enough. Gains diagrams show a rapid rise towards the 100% value, and then stabilize. The index chart also indicates that the model is good. Index values start well above 100%, remain at a high level for a while and then decrease rapidly towards the 100%.
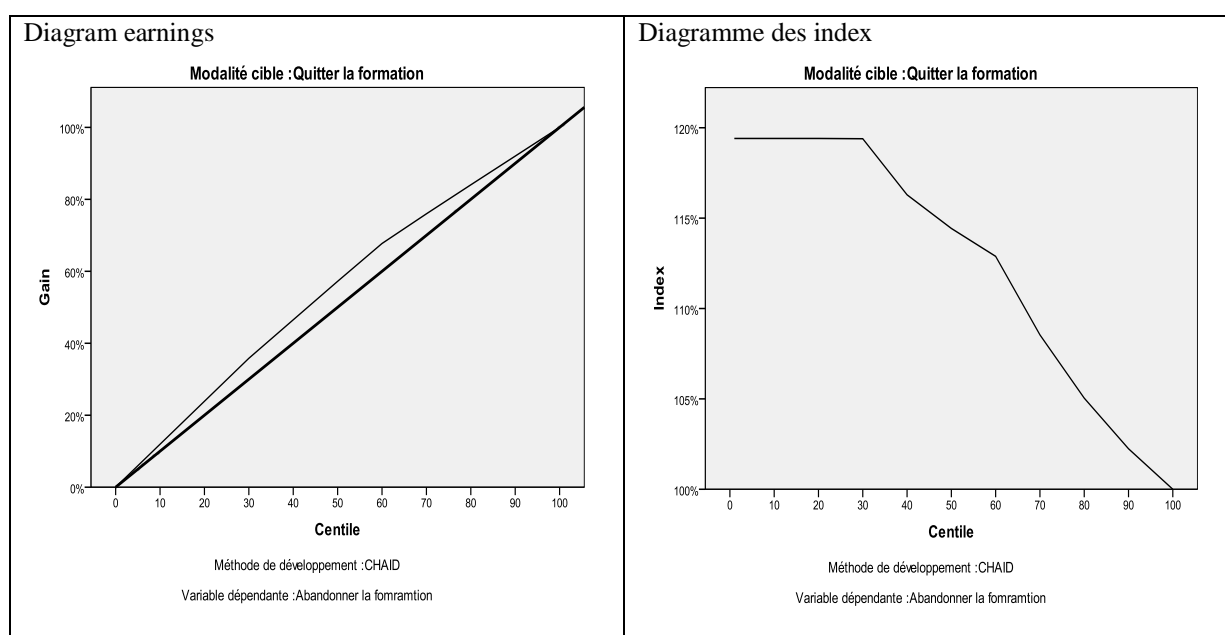
Tables of risks and rankings confirm the effectiveness of the model. The table shows that the model correctly classifies approximately 63.5% of registrants. The model also shows the following results:

- Registered women, including married (59% of the sample) have a preference for trainers. This voltage induced by the reluctance of beneficiaries to men trainers can be amplified by age differences between trainers and beneficiaries which may cause generational conflicts. Indeed, almost the half of beneficiaries (47%) more than40 years while almost 80% of trainers have less than 41%. The results also show that the level of listed and the problem of language is also crucial for monitoring literacy classes.

Conclusions and Recommendations for Policy

The analysis highlighted the variety of factors that may be causing dropout. Some of these variety are related to the characteristics of the beneficiaries, other characteristics of trainers and logistical conditions in which the literacy process takes place. Therefore, if Morocco has managed to achieve significant advances in access to literacy services, the challenge of quality remains. Moreover, the increase in capacity reception multiplies the sources of variability of the essential quality and makes the search for an answer to the challenge of quality.

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