PROPENSITY FOR ENTREPRENEURSHIP AMONG COLLEGE UNDERGRADUATES: THE CASE OF A PUBLIC UNIVERSITY IN NORTH-EASTERN PORTUGAL

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Abstract

This study looked into the entrepreneurial ability of the students of a public university in Bragança (Portugal) to identify differentiation factors of their entrepreneurial potential. A quantitative, transversal, and observational analysis was conducted involving 598 student participants. Data gathering took place between November and December 2012 and used the *Entrepreneurial Potential Indicator* questionnaire. The respondents were mostly female (61.0%), between 18 and 21 years old (53.8%), corresponding to an average of 22.6 years of age (±4.59), studied under an ordinary regime (82.6%), were from the northern region (83.9%), lived in an urban centre (53.8%) and attended the first study cycle (92.8%) of two scientific areas, namely Education Sciences (28.4%) and Technology and Management (28.4%). Over half of the respondents showed entrepreneurial skills (72.4%). Of all the human capital factors considered, the attendance regime was the only one which had no influence on the entrepreneurial potential. In fact, all the others, namely the course's scientific area and the study cycle have proven to be relevant for reinforcing or developing the students' entrepreneurial skills. None of the socio-demographic factors that were taken into consideration had any influence on entrepreneurial potential differentiation. Binary logistic regression (*logit* model) revealed a cause and effect relationship between all the characteristics and the entrepreneurial tendency.

Key-words: Higher Education; Entrepreneurial potential; Trás-os-Montes; Portugal
JEL Classification: D21, D24

Introduction

According to Bronosky [1], Higher Education Institutions have been feeling the need to motivate their students and give them the necessary skills to take entrepreneurial initiatives capable of generating employment and economic development. In Hull's *et al* [2] view identifying and subsequently using their entrepreneurial potential will, no doubt, be beneficial for society. Socio-demographic variables (such as gender, age, residing area, among others) and human capital variables (like the course) are pinpointed by Teixeira and Davey [3], as differentiating factors of the entrepreneurial potential.

The main goals of this study involved analysing the students' entrepreneurial skills in a public Higher Education institution in north-eastern Portugal and trying to ascertain whether there are significant differences in the students' entrepreneurial potential, taking into consideration socio-demographic as well as human capital factors. 598 students participated in the study which was quantitative, transversal, analytical and observational. Data were collected between November and December 2012 through the application of the *Entrepreneurial Potential Indicator* questionnaire validated for Portugal by Ferreira *et al.* [4].

This paper is structured into five sections: introduction, literature review, methodology, results and discussion and final remarks. The present section provides an explanation of the subject in question and presents both the aims and the structure of the paper. Section two does a literature review in order to give a theoretical Framework of the subject under study. The third section consists of the description of the methodology that was used to conduct this research, depicting the participants, the materials and procedures. In the fourth section, results of the statistical analysis are presented. Finally, in the last section, results are discussed and final considerations offered.

Literature Review

In Koh's [5] opinion, there is little consensus as to what entrepreneurship means or an entrepreneur does.

Cunningham and Lischeron [6] have identified six currents of thought on the subject and provide a different view of what it is to be an entrepreneur. The *Great Person School* defines the entrepreneur as someone who is born with intuition, stamina, vigor, persistence and self-esteem; on the other hand, the *Classical School* recognises the entrepreneur's innovative and discovery skills and creativity; for the *Management School*, the entrepreneur organizes, manages and takes risks; whereas the *Leadership School* sees him/her as the person who motivates, advises and leads; the *Intrapreneurship School* conceives the entrepreneur as the skillful manager of big organisations; and finally, the *Psychological Characteristics School* associates the entrepreneur with both unique values and attitudes and distinct needs.

Deo [7] claims the entrepreneur can be seen both from the economist's and the psychologist's perspective. According to Rwigema and Venter [8], the economist considers the entrepreneur as someone who is prone to innovate, to become an agent of change, to create wealth and add value to resources and other assets while introducing changes to the economy. In this context, Acs *et al*. [9] refer they generate employment and innovation and strength competitiveness. Filion [10] posits the entrepreneur is often someone who is able to identify business opportunities, market niches and therefore bring about progress.

On the other hand, Deo [7] thinks that from the psychologist's viewpoint, an entrepreneur is driven by the need to obtain or achieve something, to try and accomplish new things. Alves and Bornia [11] for instance defend that an entrepreneur has some characteristics and displays personality traits that are distinct compared to the rest of the population and that is the key to a successful entrepreneurship. As for Brockhaus and Horwitz [12], they consider that one of the basic prerequisites to entrepreneurial potential is the intention to do things and survive. Despite intensive research, it is still very difficult and challenging to define entrepreneurship, according to Mitton [13]. Departing from the *Psychological Characteristics School* and based on all the characteristics likely to potentiate entrepreneurship reported in the literature, several models have been developed and tested in order to identify entrepreneurial potential; all of them pinpoint such characteristics as the need for achievement, self-control, risk-taking propensity, ambiguity tolerance, self-confidence and

innovativeness. Therefore, these are also the characteristics addressed in the present research, seeing as Mitton [13], Markman and Baron [14] and Curral *et al.* [15] claim, that individuals who display them are more likely to become entrepreneurs in the future.

Methodology

In order to conduct this study, the authors adopted a quantitative, analytical, transversal and observational methodology. The study focused on analysing the entrepreneurial potential in a sample of students from a Higher Education Institution located in Trás-os-Montes in northeastern Portugal. The aim was to identify the students' entrepreneurial potential and decide which of the socio-demographic and human capital factors considered were likely to differentiate entrepreneurial potential.

A representative sample of the universe under study was randomly collected, consisting of 598 students. The collection of data occurred in the period between November and December 2012, using the *Entrepreneurial Potential Indicator* validated for Portugal by Ferreira *et al.* [4]. The questionnaire was created on *Google Docs* and directly administered by the students online. The questionnaire in question focus on six entrepreneurial features (Table 1) referred by Ferreira *et al.* [4] and Koh [5] and result from a set of 15 attitudes assessed with recourse to a 1 to 5 *Likert* scale discriminated as follows:

1- totally disagree;
2 - disagree;
3 – neither agree nor disagree;
4 - agree; and,
5 – totally agree.

The features to be assessed are in Table 1 and, according to Ferreira *et al.* [4] and Koh [5], may be described as follows:
- The need for achievement can be found in individuals with a strong desire to succeed who are consequently more prone to entrepreneurial attitudes.
- Self-control is linked to the individuals' ability to conduct their own lives. Therefore, individuals who have self-control believe they are capable of controlling their own lives, unlike those who do not display such characteristic who believe that what happens in their lives like luck or misfortune, are always the result of external factors.
 - Risk-taking propensity is typical of individuals whose attitudes are oriented towards making decisions in an uncertainty context. It should be noted that the risk involved is controlled.
- Ambiguity tolerance is at the basis of ambiguous situations for which there is not enough information. Individuals capable of understanding such situations and of organizing the available information prior to acting usually have this characteristic.
- Self-confidence is related to the individual's positive and confident perception about him/herself and his/her skills and abilities.
- Innovativeness has to do with seeking and developing new activities or ways of developing them.

Table 1 – Entrepreneurial features and attitudes

Features	Attitudes
Risk-taking propensity	I could describe myself as a gambler
	I believe I take higher risks than most people
	I do not engage in anything without coming up with an action plan first
	I always keep an eye on my money
	I always make rational decisions
Need for achievement	I have a strong need to do independent work
	I succeed at facing challenges and getting over problems

	Once I start a project I see it through until the end
	I believe failures are but learning opportunities
Self-control	I have a strong need to do independent work
	I clearly separate work from leisure
	I believe we make our own luck
Self-confidence	I have a strong need to do independent work
	I often follow my intuition
	I succeed at facing challenges and getting over problems
	I believe failures are but learning opportunities
Innovativeness	I'm a person of new and different ideas and solutions
Tolerance to uncertainty	I give up easily when things do not work out my way
	I do not engage in anything without coming up with an action plan first
	I'm good at dealing with ambiguous situations
	I always make rational decisions

The data collected were treated using SPSS 20.0 (*Statistical Package for Social Sciences*). Their statistical treatment was descriptive so as to characterise the sample. Thus, according to Maroco [16] and Pestana and Gageiro [17] absolute and relative frequencies were calculated whenever variables were nominal; similarly, the mean (measures of central tendency) and the standard deviation (measures of dispersion) were also calculated whenever variables were ordinal or superior. Because this was an analytical study, several statistical tests were applied, such as: localisation tests to determine whether there were significant statistical differences between the samples; association tests to find out how the entrepreneurial potential correlated with the entrepreneurial features considered; and multivariate analysis to estimate a binary logistic regression model that could identify which characteristics go hand in hand with the students' entrepreneurial skills, while understanding their explanatory power.

Following the methodology suggested by Maroco [16] and Pestana and Gageiro [17], non-parametric tests were applied to compare the entrepreneurial potential, since the necessary conditions for using parametric tests were not fulfilled. As a matter-of-fact, when data normality was tested using the *Kolmogorov-Smirnov* test with the *Lilliefors* correction (N ≥ 30) or *Shapiro-Wilk* test (N < 30), it stood out that at least one of the conditions was violated; the same occurred regarding the homogeneity of variance when the *Levene* test was applied. In view of the reasons that have already been mentioned, the *Mann-Whitney-Wilcoxon* test was used alternatively to *T-Student* for independent samples whenever comparisons involved only two samples (gender, age, residing area, attendance regime). The *Mann-Whitney-Wilcoxon* test allows us to test whether the null hypothesis of the medians is equal ($H_0: \eta_1 = \eta_2$) against the alternative one of their being different ($H_1: \eta_1 \neq \eta_2$), where η is the median.

Still according to the methodology suggested by Maroco [16] and Pestana and Gageiro [17], the *Kruskal-Wallis* was used as an alternative to *ANOVA One Way* whenever the comparison involved more than two (k) independent samples (area of origin, study cycle attended and course's scientific area). The *Kruskal-Wallis* test allows us to test the null hypothesis of the equality of medians ($H_0: \eta_1 = \eta_2 = ... = \eta_k$) against the alternative one that they are not all equal ($H_1: \exists i, j: \eta_i \neq \eta_j$).

Similarly, in order to study how entrepreneurial potential correlates to entrepreneurship- related features the *r – Pearson* test was discarded, since the condition for the application of such a test (data normality) was not fulfilled. Instead, the *Spearman* ordinal correlation test was used to measure the intensity of the relation between ordinal variables. It uses, instead of the observed values, the observations order. Thus, this coefficient is not sensitive neither to asymmetries in distribution nor to the presence of *outliers*, which means

that data do not have to be originating from Normal populations. It tests the null hypothesis (H_0: *Variables are not* correlated) against the alternative one (H_1: *Variables are correlated*).

Regression analysis is an econometric technique used to shape and analyse the cause and effect relationship between variables. Therefore, it is particularly useful in studying the relationship between entrepreneurial potential and the students' entrepreneurial characteristics so as to establish whether those characteristics have any influence or not on their tendency toward entrepreneurship.   Since the dependant variable (entrepreneurial potential) was transformed into a *dummy* one (yes = 1/no = 0), regression must be based on a linear probability model which uses non-linear functions that delimits the estimation scale. In this study, the estimation scale was delimited with recourse to one of the most frequently used distribution functions: the logistic function or *logit* model (Figure 1), as suggested by Cramer [18]. The logit function is an approximation where $E(Y_i)$ tends to 0 when X_i tends to $-\infty$ and $E(Y_i)$ tends to 1 when X_i tends to $+\infty$. The function values vary between 0 and 1 and are interpreted as the possibility that the phenomenon that is being studied may occur.   In fact, as it can be seen in Figure 1, M_i is the element's probability of belonging to group 1, that is, the probability that the phenomenon that is being studied (being entrepreneurial) may occur and $(1-M_i)$ the probability that the element belongs to group 0 (not being entrepreneurial).
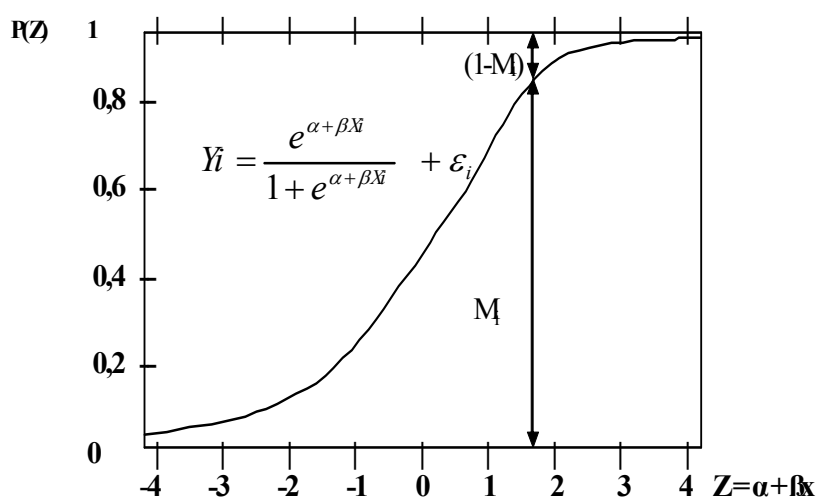

Figure 1 – Logit function configuration.
Source: Cramer [18].

Variables were chosen using the *stepwise method*, a process which is frequently used in situations in which the relationships or associations between the explanatory variables and the dependent variable are not known.   Of the variants within the *stepwise method*, the *forward stepwise* was chosen because it departs from an original model without any explanatory variable, only the constant term, to which the most significant variables are then continuingly added until the "best model" is obtained. According to Pestana and Gageiro [17], this method has the advantage of eliminating any likely multicollinearity-related problems which usually question the significance of the estimated coefficients.

One of the commonest methods to assess the model's overall quality is the "likelihood ratio" which allows us to test the null hypothesis of the coefficients being null (H_0: $\beta_1 = \beta_2 = ... = \beta_k = 0$) against the alternative one of there being at least one that is unequal to zero (H_1: $\exists\ i,j$: $\beta_i \neq \beta_j$). The critical approximate value is obtained in the chi-square distribution tables with a number of degrees of freedom which equals the number of restrictions considered in the null-hypothesis Cramer [18].

According to Pestana and Gageiro [17], the test to the model's overall quality allows us only to conclude that is explanatory power is greater than that of the model with only one independent term, in which case it is not possible to draw any conclusions as to the individual significance of each of the estimated coefficients. To do so, the *Wald* test should be used for it tests the null hypothesis H_0: $\beta_j = 0$ against the alternative H_1: $\beta_j \neq 0$. Once the model's validity as regards each estimator and the whole set of estimators is tested, the adjustment quality should also be tested. Pestana and Gageiro [17] suggest the use of *Nagelkerke* R^2.

As it can be seen in Table 2, most participants were female (61.0%); between 18 and 21 years old (53.8%) corresponding to an average of 22.6 years of age (±4.59); studied under an ordinary regime (82.6%); were from Portugal northern region (83.9%), lived in an urban centre (53.8%); attended the first study cycle (92.8%); and had chosen either technological and managerial courses or science education ones, each with 28.4%.

Table 2 – Characteristics of the Participants

Variable	Categories	Frequencies	
		%	**N**
Gender (N = 597)	Male	39.0	233
	Female	**61.0**	364
Age group (N = 598)	18 to 21years old	**53.8**	322
	≥ 22 years of age	46.2	276
Attendance Regime (N = 598)	Ordinary	**82.6**	494
	Student worker	17.4	104
Region of origin (N = 598)	North	**83.9**	502
	Centre	11.4	68
	South	1.8	11
	Madeira and Azores	1.6	10
	Other	1.2	7
Residing area (N = 598)	Rural	46.2	276
	Urban	**53.8**	322
Study cycle (N = 596)	Technological Specialization Courses	1.5	9
	Licentiate	**92.8**	553
	Post graduation/Master's	5.7	34
Scientific area (N = 598)	Agrarian Sciences	9.4	56
	Education Sciences	**28.4**	170
	Health Sciences	20.1	120
	Technology and Management	**28.4**	170
	Administration and Tourism	13.7	82

Results

As seen in Figure 2, more than half of the respondents showed entrepreneurial skills (72.4%). Risk-taking propensity stands out positively (90.8%). It is possible to conclude, then, that these students are capable of making risky decisions but based on well-founded, previously conceived action plans.   Contrarily, innovativeness proved to be a weak point (39.7%) that can be solved, though, with proper training in creativity techniques in the workplace. As for the other features, namely self-control, self-confidence, ambiguity tolerance and especially the need for achievement there is, obviously, room for improvement.
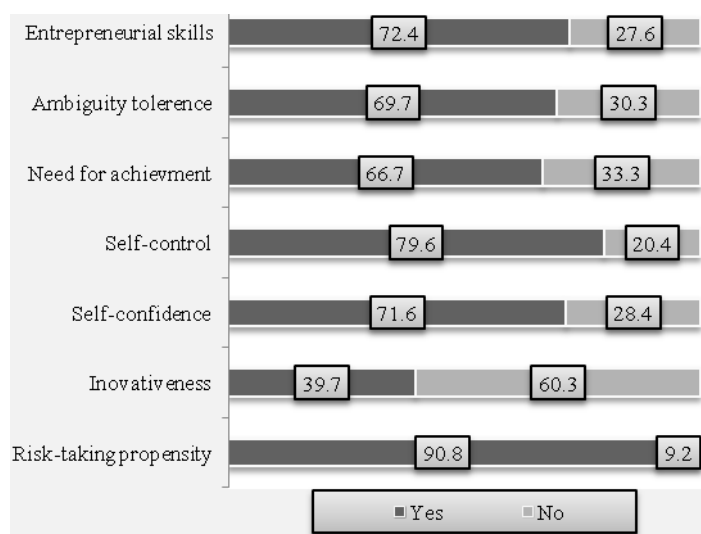
Figure 2 – Students' characteristics and entrepreneurial skills (%)

The averages registered for risk-taking propensity, innovativeness, self-confidence, self-control, need for achievement and ambiguity tolerance hover around a value of 3, which is considered satisfactory (Table 3). Furthermore, the *Spearman* test allowed us to observe that at the 1% significance level, the entrepreneurial features that contributed most to developing entrepreneurial potential were, by order of importance, self-confidence (ρ = 0.757), need for achievement (ρ = 0.750), Innovativeness (ρ = 0.699), Risk-taking propensity (ρ = 0.678), self-control (ρ = 0.668) and ambiguity tolerance (ρ = 0.627).

Table 3 - Correlation of features with entrepreneurial skills

Features	ρ	Mean	Standard deviation
Risk-taking propensity	0.678*	3.12	0.615
Innovativeness	0.699*	3.27	0.932
Self-confidence	0.757*	3.22	0.738
Self-control	0.668*	3.26	0.849
Need for achievement	0.750*	3.19	0.779
Ambiguity tolerance	0.627*	3.22	0.632

* Meaningful correlations at 0.01significance level.

The *Kruskal-Wallis* test allowed us to verify with 99% confidence level that there are significant differences in the entrepreneurial potential (*p-value* = 0.000) as regards the study cycle where the first cycle (licentiate) stands out as having the largest potential (*Mean rank* = 309.04) (see Table 4). Similarly, through the *Kruskal-Wallis* test it was possible to identify significant differences in the entrepreneurial potential (*p-value* = 0.002) bearing in mind the course's scientific area. Science Education students are potentially more entrepreneurial (*Mean rank* = 334.55).

Table 4 presents the results obtained after the *Mann-Whitney-Wilcoxon* test had been applied which showed the entrepreneurial potential does not vary according to the attendance regime (*p-value* = 0.757).

Table 4 – Entrepreneurial Potential according to some human capital factors

Factor	Categories	N	Mean rank	p-value
Attendance regime (N = 598)	Ordinary	494	300.47	0.757
	Student worker	104	294.88	
Study Cycle (N = 596)	Technological Specialization Courses	9	227.17	0.000*
	Licentiate	553	**309.04**	
	Post graduation/master's	34	145.99	
Scientific area (N = 598)	Agrarian Sciences	56	258.95	0.002*
	Education Sciences	170	**334.55**	
	Health Sciences	120	265.74	
	Technology and Management	170	293.83	
	Administration and Tourism	82	315.70	

* Significant differences at 0.01 significance level.

The *Mann-Whitney-Wilcoxon* test allowed us to establish that no significant differences were observed when socio-demographic factors, such as gender (*p-value* = 0.052) and age (*p-value* = 0.476), were taken into consideration. Likewise, the *Kruskal-Wallis* test showed that the region where the students came from (*p-value* = 0.191) and their residing area (*p-value* = 0.696) do not differentiate the students' entrepreneurial potential (Table 5).

Table 5 – Entrepreneurial potential according to some socio-demographic factors

Factor	Categories	N	Mean rank	p-value
Gender (N = 597)	Male	233	315.62	0.052
	Female	264	288.36	
Age group (N = 598)	18 to 21 years old	322	304.02	0.476
	≥ 22 years of age	276	294.23	
Region of origin (N = 598)	North	502	293.72	0.191
	Centre	68	315.20	
	South	11	380.41	
	Madeira and Azores	10	330.00	
	Other	7	389.21	
Residing Area (N = 598)	Rural	276	296.61	0.696
	Urban	322	301.98	

The *Nagelkerke* R^2 registered an 89.5% value (see Table 6). Therefore it is possible to say that proneness to entrepreneurship is 89.5% accounted for by independent variables, that is to say, by the students' entrepreneurial characteristics. On the other hand, the analysis of logistic regression results reveals a well adjusted model, since *p-value* = 0.000.

The binary logistic regression proved there is a cause and effect relationship between all the entrepreneurial features but the ambiguity tolerance and the entrepreneurial potential, with a 99% confidence level. The confidence level for the ambiguity tolerance was only 95%.

Coefficients' positive signs indicate that those who are more prone to being entrepreneurial are also more innovative, more ambiguity tolerant, more willing to take risks, more self-controlled and self-confident and have a greater need for achievement.

Table 6 – Binary logistic regression model

Independent variables	Proneness to entrepreneurship		
	β	Standard deviation	*p-value*
Self-confidence	0.693	0,145	0.004*
Risk-taking propensity	0.551	0.135	0.000*
Self-control	0.691	0.240	0.000*
Innovativeness	1.512	0.169	0.000*
Need for achievement	0.849	0.238	0.000*
Ambiguity tolerance	0.340	0.359	0.012**
Constant	-39.846	5.180	0.000*
N = 598 R^2 Nagelkerke = 0.895 χ^2 = LR = 577.77; GL= 6 *p-value* to reject H_0: 0.000			

* Significant parameters at 0.01significance level.
** Significant parameters at 0.05 significance level.

Discussion and final remarks

This study allowed its authors to conclude that most of the students who were interviewed   had entrepreneurial skills. Self-confidence, need for achievement and innovativeness were identified as the features which contribute the most to the students' entrepreneurial potential. As to ambiguity tolerance, it was referred as the feature which contributes least for entrepreneurial potential. This situation may be improved through training seminars which will help students develop skills at the level of planning and decision-making. Thus, they will be able to draw up action plans and make rational decisions while acquiring the necessary skills to handle ambiguous situations and the setbacks that are always part of any entrepreneurial process. Kyro [19] posits that some entrepreneurial skills may be innate, whereas others are acquired, developed or potentiated through education and training. According to Minuzzi *et al.* [20], the development of entrepreneurship has been the concern of several institutions, namely Higher Education institutions, which deem the spreading of culture important for the progress of a nation. In Keogh's and Galloway's [21] view, education in general and Higher Education in particular have been playing an essential role in transmitting and adapting teaching methodologies in the field of entrepreneurship to the students' needs and circumstances and to the demands of future jobs in the context of the present economy. Academic entrepreneurship is currently considered to be a fundamental means of creating new businesses and generating wealth. Therefore, according to Filion [10], Higher Education institutions must focus on developing the concept and achieving *know-how* and not only on simply spreading knowledge.

The results of this research have shown that human capital factors, such as the course's scientific area (Education Sciences) and the study cycle (licentiate) differentiate the entrepreneurial potential. As regards human capital factors, only when the attendance regime was taken into consideration were there no significant differences between the two regimes studied.

Also, none of the socio-demographic factors proved to be differentiating in terms of the entrepreneurial potential. In fact, such factors as gender, age, region of origin and residing area have no influence on the students' entrepreneurial potential. Moreover, the results obtained in the course of this research for gender and age are consistent with Koh's [5].

Finally, the estimated binary logistic regression showed that features, such as innovativeness capacity, ambiguity tolerance, risk-taking propensity, need for achievement, self-control and self-confidence were determinant for proneness to entrepreneurship. These results are well in accordance with the *Psychological Characteristics School* which ascribes

unique values and attitudes and distinct needs to entrepreneurship. The results of the *logit* model are also concurrent with those obtained by Koh [5] and Gartner [22].

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