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THE EXODUS OF MOROCCAN TALENTS ABROAD: AN EMPIRICAL STUDY OF THE EMIGRATION OF COMPUTER ENGINEERS

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Abstract: In Morocco, the growing concern over the brain drain of IT professionals has raised significant questions about the country's capacity to retain its highly skilled workforce, especially as information technology (IT) plays a crucial role in national economic development. Every year, a significant number of Moroccan engineers specialized in computer science seek opportunities abroad, highlighting the urgent need to develop strategies that strengthen the national technological ecosystem. Despite the importance of this issue, few studies have addressed it due to a lack of statistical data. This article aims to explore the current situation and analyze the motivations driving Moroccan computer engineers to emigrate. Based on a cross-sectional study conducted from January 2022 to October 2023, an electronic questionnaire was distributed to Moroccan engineers working abroad. Through factorial correspondence analysis, the study identifies key factors influencing this trend, notably enhanced professional prospects, such as faster and more diverse career advancement, and improved working conditions, including modern and well-equipped environments. These elements emerge as the primary drivers of emigration.
Keywords: Moroccan computer engineers, emigration, shortage, work environment, factorial correspondence analysis

INTRODUCTION

Computer engineering is a globally sought-after profession, characterized by strong demand, competitive salaries, and diverse career opportunities. According to the U.S. Bureau of Labor Statistics (2021)[1], employment in the computer and information technology sectors is projected to grow by 11% between 2019 and 2029, surpassing the average for all occupations. This trend underscores the vital role of computer engineers in driving innovation and economic growth, particularly in the context of emerging technologies such as Big Data and artificial intelligence (Manyika et al., 2013)[2].

However, this demand poses specific challenges for countries like Morocco, where brain drain is becoming increasingly pronounced. The exodus of skilled professionals, particularly computer engineers, raises major concerns among Moroccan businesses and policymakers. Research indicates that the departure of these qualified workers not only leads to a loss of essential skills for the national economy but also hinders technological advancement and economic development (Docquier & Rapoport, 2012)[3]. For example, the Moroccan Ministry of National Education, Vocational Training, Higher Education, and Scientific Research reports that over 600 engineers emigrate from the country each year (Ministry of Education, 2022)[4], exacerbating the challenges faced by the technology sector.

Theoretical frameworks shed light on this complex issue. The Harris-Todaro migration model (1970)[5] suggests that income disparities between regions or countries are primary

1. **U.S. Bureau of Labor Statistics.** (2021). *Occupational outlook handbook: Computer and information technology occupations*. U.S. Department of Labor.

2. **Manyika, J., Chui, M., Bughin, J., Brown, B., & George, K.** (2013). *Disruptive technologies: Advances that will transform life, business, and the global economy*. McKinsey Global Institute.

3. **Docquier, F., & Rapoport, H.** (2012). *Globalization, brain drain, and development*. In A. B. Atkinson & F. Bourguignon (Eds.), *Handbook of income distribution* (Vol. 2, pp. 1487–1541). Elsevier.

4. Over 600 Moroccan Engineers Move Overseas Every Year

5. **Harris, J. R., & Todaro, M. P.** (1970). Migration, unemployment, and development: A two-sector analysis. *American Economic Review, 60*(1), 126–142.

drivers of migration. In Morocco, many computer engineers may perceive better economic opportunities abroad, prompting them to leave. Additionally, human capital theory (Becker, 1964)[6] posits that individuals invest in education and skills to maximize their future income, making it likely that qualified professionals seek opportunities in countries offering better prospects when local labor markets are insufficient.

The economic implications of professional departures are significant. Brain drain not only depletes the national workforce but also undermines the country's ability to innovate, reduces productivity, and ultimately hinders economic growth. This study aims to address the crucial question: what are the motivations driving Moroccan computer engineers to emigrate abroad? Understanding this phenomenon is essential, given the substantial number of engineers leaving the country, which poses a major challenge for Morocco's economic and technological development.

The research will focus on the motivations that lead Moroccan computer engineers to emigrate, particularly to destinations such as Germany, Belgium, Canada, France, and the United Arab Emirates, as indicated by questionnaire responses. The study will be structured around three main axes: (1) presenting the theoretical and empirical motivations behind the brain drain of engineers, (2) providing a descriptive analysis of the current state of brain drain among engineers in Morocco, and (3) conducting an empirical study based on a sample of engineers to illuminate the explanatory variables influencing their migration decisions.

THEORETICAL AND EMPIRICAL MOTIVATIONS

The literature on migration factors has evolved significantly in recent decades, giving rise to theoretical models that analyze the underlying motivations for migration decisions. Among these models, the works of Price (2001)[7] and Dainotto (2011)[8] stand out for their ability to structure the influences shaping individuals' career trajectories, particularly for Moroccan computer engineers. Understanding these theoretical frameworks is essential to contextualize the emigration of Moroccan engineers, as they shed light on the complex interaction between personal determinants, external factors, and organizational conditions.

THE PRICE CAREER ROTATION MODEL

Price's (2001) model posits that career decisions, including the decision to migrate, are influenced by three interconnected dimensions: personal determinants, external environmental factors, and internal organizational conditions. Each of these dimensions plays a crucial role in the decision-making process of engineers, especially in the case of Moroccan computer engineers, whose migration decisions are shaped by a complex set of factors.

*Personal Determinants***:** This dimension encompasses individual attributes such as job satisfaction, commitment to the organization, and personal aspirations. These determinants are fundamental because they influence individuals' perceptions of their professional environment and career opportunities. In Morocco, many computer engineers feel a disconnect between their qualifications and the opportunities available in the local market. Research by Mobley et al. (2010)[9] indicates that dissatis-

6. **Becker, G. S.** (1964). *Human capital: A theoretical and empirical analysis, with special reference to education* (2nd ed.). University of Chicago Press.
7. **Price, J. L.** (2001). *The Price career rotation model: Career decision making in organizations*. Journal of Career Development, 28(2), 167–182.
8. **Dainotto, R.** (2011). *Migration and contextual factors: A theoretical framework*. International Migration Review, 45(4), 1212–1235.
9. **Mobley, W. H., Griffeth, R. W., Hand, H. H., & Meglino, B. M.** (2010). *Review and conceptual analysis of the employee turnover process*. Psychological Bulletin, 86(3), 493–522.

faction, often caused by a lack of recognition and professional development, drives individuals to consider migration. Stagnant salaries, the absence of mentorship, and limited career advancement prospects create an environment where engineers feel undervalued. Consequently, many seek opportunities abroad, where their skills are more likely to be recognized and appropriately compensated.

External Environmental Factors: This dimension includes broader socio-economic conditions, labor market dynamics, and cultural influences that affect career choices. The Moroccan labor market is characterized by high unemployment rates, particularly among young graduates, and economic constraints that significantly influence engineers' decisions. The perception of limited career prospects creates a sense of urgency to seek employment abroad, where demand for qualified computer engineers is higher. Additionally, social factors such as the aspiration for a better quality of life, improved living conditions, and access to familial and social networks in host countries also motivate engineers to migrate. These networks provide logistical and emotional support, making the transition to a new environment more attractive.

Internal Organizational Conditions: Internal organizational conditions refer to workplace characteristics, including management practices, organizational culture, and employee engagement. A favorable work environment can enhance job satisfaction and employee retention. However, many Moroccan companies suffer from bureaucratic structures, limited investment in employee development, and a lack of innovative practices. Restrictive management styles, limited access to cutting-edge technologies, and the absence of continuous training can lead to disengagement among engineers. When employees perceive their work environment as unsatisfactory, they are more likely to explore opportunities elsewhere, offering more autonomy and professional development.

DAINOTTO'S CONTEXTUAL FRAMEWORK

Dainotto (2011) enriches the understanding of migration motivations by emphasizing the importance of context. His theoretical framework argues that migration decisions are influenced not only by individual choices but also by broader socio-political and economic conditions.

Contextual Factors in the Moroccan Environment: Dainotto's framework emphasizes that migration decisions are influenced by political, economic, and social contexts. In Morocco, factors such as political instability, economic uncertainty, and rapid changes in the global landscape significantly affect the migration decisions of skilled professionals. Engineers may perceive the local political climate, often marked by periods of unrest and uncertainty, as an obstacle to professional stability. Economic challenges such as inflation, currency fluctuations, and high living costs impact job security and quality of life, thus strengthening the choice to migrate. Furthermore, the global demand for skilled professionals, particularly in the tech sector, creates pull factors that drive engineers to seek more stable and prosperous working conditions abroad.

INTEGRATION OF PRICE'S CAREER ROTATION MODEL AND DAINOTTO'S CONTEXTUAL FRAMEWORK

Integrating Price's Career Rotation Model and Dainotto's Contextual Framework offers a better understanding of the motivations underlying the emigration of Moroccan computer engineers. The engineers' personal experiences, such as professional dissatisfaction and the search for career advancement, play a key role in this process. Many engineers express concerns about inadequate salary structures, limited access to training, and a lack of career progression opportunities, prompting them to seek opportunities abroad that promise a more fulfilling professional life.

Moreover, Morocco's socio-economic landscape, characterized by high unemployment rates especially among young graduates exerts additional pressure on engineers to seek employment abroad. The appeal of stable and lucrative positions in developed countries is a strong motivator. Finally, the organizational culture within Moroccan companies significantly impacts employee retention. Many companies struggle with bureaucratic structures and hierarchical management styles that limit autonomy, innovation, and creativity, leading to disengagement and high turnover rates. When engineers perceive their organizations as lacking innovation and professional development opportunities, they are more likely to explore opportunities abroad that offer greater autonomy and career progression.

DESCRIPTIVE ANALYSIS OF THE BRAIN DRAIN AMONG MOROCCAN COMPUTER SCIENTISTS

The emigration of Moroccan computer engineers abroad is a major concern for both businesses and authorities in the country. Despite significant efforts by Morocco to increase its engineering workforce to meet development needs, the persistent shortage of professionals in the field of information technology poses a serious challenge. The annual exodus of 600 engineers graduating from top schools, primarily specializing in Information and Communication Technologies (ICT), as announced by the former Minister of National Education, underscores the magnitude of the problem.

Several factors contribute to this brain drain. Developed countries, such as France, Canada, China, and others, actively seek highly skilled workers to support their knowledge-intensive economic activities. This foreign demand creates international competition for young Moroccan engineers, who are attracted by a better quality of life, more interesting career prospects, and more favorable working conditions.

The Association of Engineers from the National School of Computer Science and Systems Analysis (ENSIAS) highlights that, in 2022[10], up to 80% of recent graduates find employment within European companies. Additionally, the Moroccan Federation of Information and Communication Technologies and Offshoring reports a monthly loss of approximately 50 talented engineers to foreign countries in 2022[11], posing a major challenge for the information technology sector in Morocco.

Similarly, alarming statistics from the Association of Users of Information Systems in Morocco (AUSIM)[12] show a significant increase in the departure rate of Moroccan engineers to foreign countries in recent years. The age group of 25 to 35 years, representing the workforce's core, is particularly affected, resulting in a significant loss of human capital for Morocco.

Another challenging issue that needs to be addressed is the low rate of return of Moroccan engineers after gaining experience abroad, with only 30% choosing to return to their home country. This sustained loss of skills exacerbates the situation and underscores the urgent need for Morocco to implement incentive measures to retain its talented computer engineers and promote the sustainable development of the sector.

10. **Association of Engineers from the National School of Computer Science and Systems Analysis (ENSIAS). (2022). Graduates' employment rates and migration trends in 2022. ENSIAS Report.**

11. **Moroccan Federation of Information and Communication Technologies and Offshoring.** (2022). *Monthly loss of engineers to foreign countries: A report on the state of the ICT sector*. Moroccan Federation Report.

12. **Association of Users of Information Systems in Morocco (AUSIM)**. (2022). *Emigration trends and the impact on Morocco's information systems sector*. AUSIM Report.

METHODOLOGY OF THE EMPIRICAL STUDY

To deepen our understanding of the specific factors influencing the emigration decisions of specialized Moroccan IT professionals, this empirical study was conducted between January 2022 and October 2023. The target population consisted of 600 expatriate professionals, and data were collected through a questionnaire distributed electronically to Moroccan IT engineers who chose to work abroad. This process yielded 386 usable responses, ensuring a robust sample for analysis.

DATA COLLECTION PROCESS AND SAMPLE SELECTION CRITERIA

Data collection utilized a non-probability sampling method, specifically snowball sampling, which is particularly effective for reaching hard-to-access populations like expatriate professionals. The questionnaire was distributed electronically through various platforms, including professional social networks (such as LinkedIn), expatriate forums, and engineering associations focused on Moroccan professionals abroad.

REASONS FOR CHOOSING THIS METHOD:

- **Accessibility:** Comprehensive lists of Moroccan IT engineers working abroad are often difficult to obtain. Snowball sampling leverages existing networks to reach relevant participants.
- **Geographic Diversity:** This approach allowed us to connect with a wide range of host countries, enriching the collected data and providing a comprehensive view of emigrants' motivations.

INTERNAL VALIDITY

Internal validity refers to the extent to which the results of a study accurately reflect the relationship between independent and dependent variables, free from the influence of confounding factors. In this research, internal validity is crucial for establishing the credibility of findings regarding the motivations behind the emigration decisions of Moroccan IT professionals.

MEASURES TAKEN TO ENSURE INTERNAL VALIDITY

- **Standardized Questionnaire:** The questionnaire was developed based on a thorough review of the existing literature and piloted to ensure clarity and relevance. This minimizes potential biases and ensures that the collected data accurately represent respondents' experiences and opinions.
- **Closed-Ended Questions:** The questionnaire primarily included closed--ended questions to quantify various motivational factors, demographic information, and emigration trends. This facilitates statistical analysis and allows for clear conclusions.

SAMPLE CHARACTERISTICS

- **Gender Distribution:** The sample exhibits a marked gender gap, with men representing 69.9% and women 30.1%. This imbalance is attributed to historical trends in the IT field, which has often been perceived as aligning more with male interests and aspirations.
- **Age Distribution:** The largest group of expatriate Moroccan engineers consists of individuals aged 30 to 34, accounting for 37.8% of the sample. This indicates that many professionals choose expatriation at an advanced stage of

their careers, seeking broader opportunities abroad. Additionally, 21.5% of respondents are between 25 and 29 years old, reflecting an early interest in international experience shortly after graduation.

- **Marital Status:** Marital status plays a crucial role in the decision to emigrate, with 66.8% of engineers being married. This suggests that many professionals relocate abroad with their families to enhance their quality of life and professional opportunities.
- **Education Level:** The educational backgrounds of respondents are diverse, with 73.1% attending an engineering school and 26.9% completing postgraduate studies. This diversity underscores the adaptability of Moroccan IT professionals to technological advancements and their ongoing quest for excellence.

Gender	Man Woman	**69.9%** **30.1%**
Age	25-29 years 30-34 years 35-39 years 40-45 years	**21.5%** **37.8%** **25.9%** **14.8%**
Marital Status	Married Single	**66.8%** **33.2%**
Educational Background	Engineering School Engineering School + Postgraduate	**73,1%** **26.9%**
Country of Residence	Germany Belgium Canada United Arab Emirates France	**17.9%** **11.1%** **13.7%** **19.9%** **37.3%**

Table 1: Characteristics of the Sample of Computer Engineers

Source: Compiled by us from the survey data on the emigration of Moroccan computer engineers abroad, conducted between January and April 2022, as well as from January 2022 to October 2023.

EMIGRATION TRENDS

The decision to emigrate is widespread among engineers, with 85% making this choice relatively early in their careers, with less than five years of experience in Morocco. Notably, 8% accumulated between five and ten years of experience before emigrating, indicating varied professional trajectories within this community.

EMIGRATION MOTIVATIONS

- **Salary Dissatisfaction:** A significant proportion of 23.3% of engineers cite unsatisfactory salaries as a major source of discontent, particularly among those aged 30 to 34 (8.3%) and 35 to 40 (6.0%). Young engineers, facing financial challenges such as loan repayments and family responsibilities, tend to prioritize salary equity to secure their financial future.
- **Recognition of Achievements:** Furthermore, 14.8% of respondents feel their achievements are insufficiently recognized within their companies, particularly among engineers aged 30 to 34 (6.7%). This dissatisfaction often manifests in a lack of positive feedback, promotional opportunities, or minimal verbal acknowledgment.
- **Career Advancement Opportunities:** Additionally, 14% of engineers report leaving their jobs due to unsatisfactory career advancement, highlighting the importance of professional development opportunities.

Other factors contributing to emigration include communication issues (8.5%), lack of innovative projects (8.0%), absence of training opportunities (8.3%), and the search for flexibility (5.7%). Finally, 3.9% of engineers cited difficult relationships with colleagues as a reason for their departure, indicating a challenging work atmosphere that hinders harmonious collaboration.

To analyze the motivations behind the choice of residence among Moroccan IT professionals, a detailed examination of the contributions to the dimensions resulting from Correspondence Analysis (CA) was conducted. This analysis identified key factors influencing their emigration decisions, considering various reasons and their preferred countries of residence. In this context, positive coefficients in the CA signify "pull factors" that attract professionals to emigrate, while negative coefficients indicate "push factors" compelling them to leave their home country.

The first dimension emphasizes salary dissatisfaction as a significant driver of emigration among Moroccan computer engineers, contributing positively (0.770), particularly for those emigrating to Canada (0.948). The appeal of higher salaries and more attractive financial opportunities in Canada is a primary explanation for this trend. This reveals a direct correlation between salary conditions in Morocco and migration choices, where engineers facing unsatisfactory remuneration actively seek better financial prospects abroad. This underscores the profound influence of financial incentives on individual emigration decisions.

Additionally, Canada is currently experiencing a shortage of computer engineers, further motivating Canadian companies to attract skilled professionals from around the globe, including Morocco, to fill this gap and maintain their competitive edge.

Conversely, dissatisfaction with career advancement presents a significant negative contribution (-0.560), particularly influencing emigration towards France (-0.404). This suggests that limited professional growth opportunities in Morocco push engineers to seek better prospects in France, perceived as offering more favorable career development pathways. Constraints on advancement opportunities in Morocco may stem from rigid organizational structures, unclear promotion policies, and stagnant economic sectors. France, with its reputation as a vibrant technological hub and strong economy, provides diverse professional opportunities, a skilled workforce, and favorable policies for foreign talent, making it an attractive destination for IT professionals.

The second dimension reveals that unmet career expectations are a substantial motive for emigration, supported by a significant positive contribution of 0.605. This indicates that IT professionals feeling stagnant in their local career prospects turn to international opportunities in search of more promising futures. Their decision is driven not only by a strong desire for growth but also by a negative perception of the national professional environment.

Dissatisfaction with local career development can be attributed to various factors, including restrictive corporate policies, insufficient investments in training, and limited advancement opportunities. Consequently, IT professionals aspiring to meaningful career growth seek foreign territories where opportunities for development are perceived as more dynamic and appealing.

Among preferred destinations, the United Arab Emirates emerges prominently with a coefficient of 0.469. This suggests that dissatisfaction with career advancement in Morocco is a motivating factor for emigration to this region, which is seen as a fertile ground for achieving professional aspirations due to its dynamic job market and attractive growth prospects.

Moreover, the lack of professional recognition is another critical reason driving Moroccan IT professionals to consider emigration. The significant negative contribution of -0.633 indicates that the absence of acknowledgment for their skills and achievements in Morocco significantly influences their decisions to seek opportunities abroad. This unfavorable perception may stem from a corporate culture that undervalues recognition, ambiguous promotion criteria, and a lack of formal reward mechanisms.

Belgium, with a notable coefficient of -1.129, is perceived as a destination that offers better recognition and appreciation for the skills of Moroccan IT professionals. Factors such as corporate policies, human resource practices, and the professional culture in Belgium likely play a crucial role in attracting these professionals.

In terms of the quality of representation of rows and columns in the CA dimensions, the variable relationships are as follows:

- **Dimension 1:** Focusing on reasons for expatriation, salary dissatisfaction predominates at 58.4%, with a positive contribution of 0.770. In contrast, dissatisfaction with career progression in Morocco accounts for 18.5%, with a negative contribution of -0.560. Examining the "country of residence," Canada is strongly associated with 52% and a high positive coefficient of 0.948, while France has a negative coefficient of -0.008, associated with 25.7%. This reveals a positive correlation between salary dissatisfaction and the choice to emigrate to Canada, indicating that IT professionals are primarily drawn to this country for its more attractive salary prospects. Conversely, there is an inverse correlation between dissatisfaction with career progression in Morocco and emigration to France, suggesting that limited opportunities for growth are pushing these professionals away from their home country.
- **Dimension 2:** This dimension focuses on the implications of unmet career expectations. Career stagnation contributes positively at 30.5%, with a positive contribution of 0.605, while a lack of recognition accounts for 26.3% with a negative contribution of -0.633. The United Arab Emirates is positively associated with this dimension, showcasing an emerging opportunity for Moroccan IT professionals. This highlights the importance of addressing these factors in understanding the emigration trends of highly skilled IT professionals.

The analysis of the diagram confirms the validity of the conclusions drawn from the contribution tables by formally and technically presenting the underlying relationships. On the horizontal axis, a significant correlation emerges, indicating that individuals who feel injustice in the promotion process are more inclined to choose Belgium as their expatriation destination. Simultaneously, the observation of the vertical axis reveals a positive correlation between disappointment with career progression and the choice to expatriate to the United Arab Emirates. Thus, individuals dissatisfied with the progression of their careers, feeling unfulfilled expectations, demonstrate an increased propensity to opt for the United Arab Emirates as their expatriation destination.

Following their expatriation, Moroccan engineers report varying levels of job satisfaction, with 31.9% feeling particularly valued for their skills. This sentiment is notably more pronounced among male engineers, with 20.7% expressing positive feelings, compared to only 11.1% of their female counterparts. Factors such as financial benefits and equitable promotions significantly contribute to overall job satisfaction, highlighted by 33.4% of respondents for each aspect.

Additionally, 17.4% of engineers cite the expansion of their professional networks as a key advantage, while 15.0% value the diversity of projects available to them. Modern working conditions also play a crucial role in enhancing their professional well-being, with flexibility reported by 13.2% and access to advanced technologies acknowledged by 22.0% of the engineers.

Presentation of line points.

The reasons	Mass	Dimension score.		Inertia	Contribution				
		1	2		From the point to the inertia of the dimension.		From the dimension to the inertia of the point.		
					1	2	1	2	Total
Employer underutilized my skills.	,135	-,292	,162	,011	,048	,019	,257	,064	,321
Salaries didn't match work value.	,233	,770	,211	,036	,584	,054	,906	,055	,961
No input sought in decisions.	,085	-,363	-,672	,015	,047	,202	,180	,499	,679
Uneven distribution of raises and promotions.	,148	-,113	-,633	,014	,008	,310	,031	,792	,824
Lack of training for new technologies.	,083	,316	-,018	,007	,035	,000	,278	,001	,279
Career progression fell short.	,140	-,560	,605	,022	,185	,268	,469	,441	,910
Limited technical challenges in projects.	,080	,061	-,376	,003	,001	,059	,027	,838	,865
Job lacked freedom from constraints.	,057	-,459	,026	,004	,051	,000	,671	,002	,673
Dissatisfaction with superiors and colleagues.	,039	-,493	,657	,009	,040	,088	,262	,377	,639
Total assets	1,000			,120	1,000	1,000			

a. Symmetric normalization

Table 2: Presentation of data points depicting reasons for expatriation and countries of residence of engineers.

Source : Source: SPSS output created by us from the survey data on the emigration of Moroccan engineers specialized in computer science abroad, conducted from January 2022 to October 2023

Countries of residence	Mass	Score de la dimension		Inertia	Contribution				
		1	2		From the point to the inertia of the dimension.		From the dimension to the inertia of the point.		
					1	2	1	2	Total
United Arab Emirates	,199	-,277	,469	,018	,065	,230	,204	,472	,676
Germany	,179	,455	,168	,020	,157	,027	,450	,050	,499
Canada	,137	,948	,037	,035	,520	,001	,839	,001	,840
Belgium	,111	-,049	-1,129	,029	,001	,743	,002	,935	,937
France	,373	-,404	-,008	,019	,257	,000	,750	,000	,750
Total assets	1,000			,120	1,000	1,000			

a. Symmetric normalization

Table 3: Presentation of column points

Source : Source: SPSS output created by us from the survey data on the emigration of Moroccan engineers specialized in computer science abroad, conducted from January 2022 to October 2023

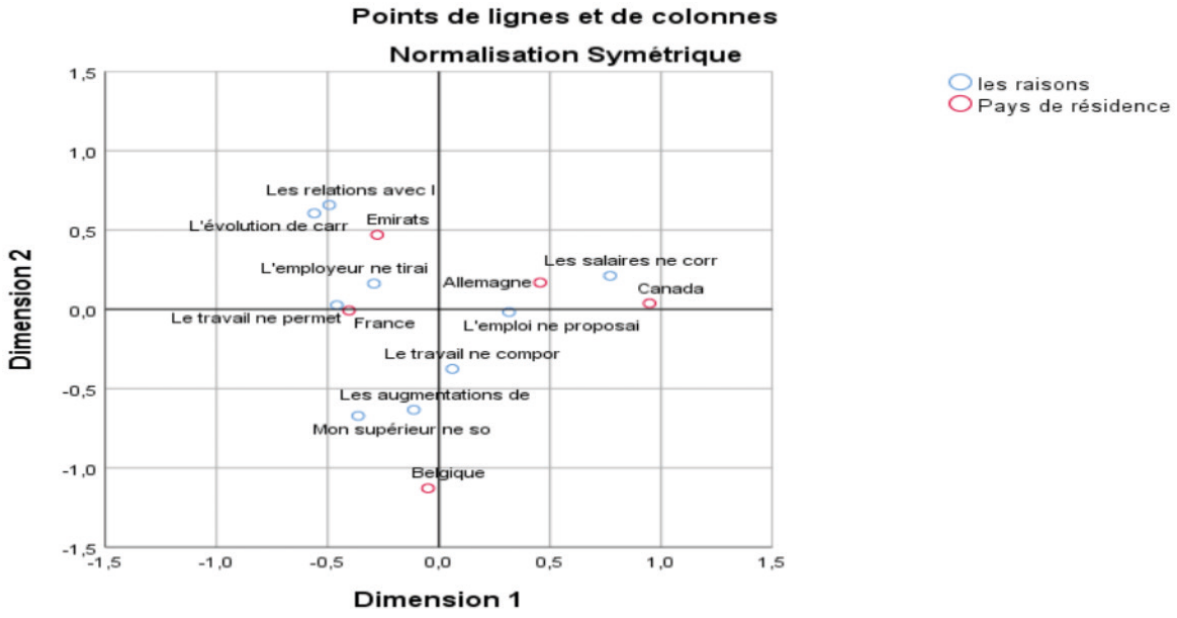

Figure 1: Diagram confirms the conclusions drawn from the contribution tables. Source : Source: SPSS output created by us from the survey data on the emigration of Moroccan engineers specialized in computer science abroad, conducted from January 2022 to October 2023

Regarding professional fairness, 33.4% of engineers express satisfaction with their compensation and advancement opportunities, while 30.1% emphasize equitable access to project opportunities. Furthermore, a significant majority—68.7%—express the desire to settle permanently in their host country, underscoring their overall contentment with both living conditions and professional opportunities.

LIFE STORY OF AN EXPATRIATE ENGINEER

Ahmed, a 32-year-old computer engineer, grew up and studied in Morocco. A graduate of a leading engineering school in Casablanca, he began his career in a renowned technology company. Over the years, however, he gradually found himself confronted with a lack of opportunities for professional development. At the beginning of his career, although he was motivated by the desire to contribute to the technological development of Morocco, he quickly realized that his ambitions were limited by a work environment that was not conducive to professional development.

"I quickly realized that despite my skills and achievements, I did not have access to real prospects for progression. Promotions were rare, and although I did everything I could to make a difference, my efforts were often ignored," explains Ahmed. This feeling of stagnation in his career began to weigh heavily on his morale, leading him to question his professional future in his country.

The turning point for Ahmed was a discussion with a former classmate who had settled in Montreal. The latter regularly spoke to him about his experience in Canada: the recognition of his work, the evolution of his career, but also the quality of life he had found there. "At first, I didn't really see what it would change for me, but after a few months of discussions, I realized that I was at a professional dead end in Morocco," adds Ahmed.

Ahmed then decided to find out more about job opportunities abroad and quickly realized that the decision to emigrate was not just a quest for better salaries, but also a search for more fulfilling professional conditions. "I needed to feel that my work mattered, that I

had an impact. The idea of staying in an environment where my skills were undervalued and where I had no chance of professional development seemed unbearable to me."

In 2020, after several months of preparation, Ahmed decided to apply for a position in Montreal. The offer he received was attractive: a position with interesting responsibilities, a higher salary, but above all a promise of recognition for his work and an environment conducive to innovation. "The offer I received was too tempting to refuse. It wasn't just a question of salary, but of an opportunity to flourish," he explains.

Today, settled in Montreal, Ahmed does not regret his decision. Although he had to adapt to a new culture and a harsh climate, he recognizes that he found the professional space he dreamed of. "I have no regrets. Although the beginning was difficult, I feel like I found an environment where I can really grow. My work is appreciated here, my colleagues support me and I'm not afraid to bring new ideas," he explains.

However, Ahmed emphasizes that his story is not unique. Many Moroccan engineers, like him, choose to emigrate, not only for economic reasons, but also because of a lack of professional recognition and stagnation in their careers in their home country. "It is not a rejection of my country, but rather a search for better professional opportunities. If the conditions were better, I would come back without hesitation," he adds.

This personal story highlights the deep reasons that push many Moroccan engineers to leave their country: the quest for professional recognition, the need to evolve in a dynamic and innovative environment, as well as the aspiration for a better balance between professional and personal life. Behind the statistical data that highlight the scale of the emigration of Moroccan talents, there are individual trajectories marked by dreams, frustrations and hopes for positive changes in their careers.

DISCUSSION OF RESULTS

This in-depth study has highlighted multiple factors influencing the professional migration choices of Moroccan IT engineers established abroad. These factors fit into a complex decision-making process, which can be grouped into several essential categories.

COMPENSATION

Compensation emerges as one of the most crucial factors in the decision to migrate. Salary dissatisfaction in Morocco, particularly among young professionals aged 30 to 34 with less than five years of experience, constitutes a significant driver of emigration. Data reveals that these individuals seek opportunities abroad where they believe they can obtain more competitive compensation. This observation aligns with the work of Mobley et al. (2010), who conclude that unmet salary expectations are a major catalyst for professional migration. However, it is essential to nuance this finding, as Piore (1979) emphasizes that non-economic factors, such as quality of life, can also influence migration decisions, allowing for a more holistic understanding of this phenomenon. Thus, it would be pertinent to explore how the perception of quality of life interacts with salary expectations to influence migration choices.

CAREER MANAGEMENT

Career management is also a fundamental element influencing migration decisions. About 20% of respondents highlight the importance of effective career management within their companies. The lack of advancement opportunities, training, and professional development can lead to significant frustration. This dynamic aligns with Price's career rotation model, which emphasizes the importance of organizational conditions in retaining talent. Studies such as that of Huang and Gamble (2015) support this notion, indicating that the absence of clear paths for professional

advancement increases emigration. It would be interesting to hypothesize that improving professional development programs could reduce migration rates among young engineers.

RELATIONSHIPS WITH SUPERVISORS

Relationships with supervisors play a significant role in employee engagement and their intention to migrate. Approximately 7.2% of respondents aged 30 to 34 express dissatisfaction in this regard. Elements such as organizational support, recognition, autonomy, and communication are crucial. This observation fits within Dainotto's theoretical framework, which emphasizes that the organizational and social context plays a decisive role in migration decisions. Research by Kahn and Byos (2015) shows that positive interactions with management foster employee engagement, thereby reducing their intention to leave. Conversely, Baruch and Holtom (2008) argue that negative work relationships can sometimes be offset by substantial economic benefits, making professionals less inclined to depart. In this regard, it could be hypothesized that enhancing supervisors' leadership skills could positively influence employees' intention to stay.

DISTRIBUTIVE JUSTICE

The perception of distributive justice, that is, how a company's resources (such as bonuses and training opportunities) are allocated, also influences migration intentions. Professionals with less than five years of experience believe that distributive injustice leads to disengagement within the company. This finding is supported by the work of Greenberg (1990), which shows that organizational justice directly impacts employee satisfaction and loyalty. This implies that companies must ensure equitable distribution of resources to maintain employee engagement. However, as Adams (1965) points out, the perception of justice is subjective and can vary significantly from individual to individual, complicating the generalization of results. It would be interesting to explore how internal communication programs regarding resource distribution criteria could influence this perception of justice.

WORK ORGANIZATION

Working conditions, such as disruptions in IT project strategies, the use of outdated technologies, and inefficient task allocation, hinder employee engagement and may prompt them to consider leaving their positions. The absence of a clear strategy and opportunities for skill development are critical drivers encouraging professionals to seek better prospects abroad. This dynamic is supported by the work of Hackman and Oldham (1976), which emphasizes the importance of a positive work environment for employee well--being. However, Breaugh's (1985) research indicates that organizational structure can also influence employees' ability to engage and adapt. This raises the hypothesis that companies investing in modern technologies and flexible work structures could experience a decrease in migration rates.

AVAILABILITY OF INTERNATIONAL OPPORTUNITIES IN THE ICT SECTOR

The availability of international opportunities constitutes a significant driver of migration. Companies in Europe and North America actively seek talent, and countries like Germany offer attractive programs, such as the International Academy of Freiburg. Canada, with its favorable immigration policies, stands out as an appealing destination for Moroccan professionals, drawn by its high quality of life and opportunities for personal and professional development. This observation aligns with Dainotto's framework, which

highlights that broader socio-economic conditions influence individual decisions. However, De Haas (2010) warns of inequalities that may exist in access to these opportunities, depending on the regions and socio-economic status of migrants. An interesting hypothesis would be to explore how equitable access policies to international opportunities could influence the migration of IT engineers.

CONCLUSION

This study provides an in-depth analysis of the multiple factors influencing the professional migration choices of Moroccan computer engineers. The results indicate that a combination of economic and non-economic elements significantly shapes these decisions. While salary compensation is identified as a key factor, other aspects such as career management, the quality of interpersonal relationships, the perception of distributive justice, and working conditions also play a crucial role in migration decisions.

However, this research has certain limitations. First, although the sample of participants is significant, it may not fully reflect the diversity of experiences and perceptions of Moroccan engineers in other regions or sectors. Additionally, reliance on self-reported data may introduce biases in the responses. Finally, recent developments in the global labor market and immigration policies, which may also influence the motivations and decisions of professionals, are not addressed in this study, potentially limiting the applicability of the results.

To mitigate brain drain, it is imperative that Moroccan organizations implement strategies to improve salary competitiveness, provide clear paths for advancement, foster positive working relationships, and ensure fair distribution of resources. It is also crucial for the government and businesses to collaborate to create talent retention incentive programs, such as research grants, internships abroad with job guarantees upon return, and initiatives to strengthen the local entrepreneurial ecosystem.

Furthermore, promoting a culture of innovation and collaboration within the information and communication technology sector could encourage professionals to stay and contribute to the local economy. By addressing these issues, companies can not only improve employee retention but also mitigate the exodus of qualified professionals.

Thus, understanding the complex motivations behind migration can guide policymakers and organizations in creating an environment conducive to talent retention. This will contribute to the sustainable development of the ICT sector and, by extension, to the Moroccan economy as a whole. The insights derived from this study enrich not only the academic discourse on migration but also serve as a practical foundation for addressing the pressing issue of brain drain in Morocco.

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