EMPLOYABILITY STUDY

BACHELOR OF SCIENCE IN ENGINEERING

ESCUELA DE INGENIERÍA
FACULTAD DE INGENIERÍA

Integration

EMPLOYABILITY STUDY
BACHELOR OF SCIENCE IN ENGINEERING

Executive Summary:

- This material summarizes the main findings from the **"BS in Engineering UC" employability study** developed by the **School of Engineering** and **Integration Consulting** between March and October of 2020.
- The objective of the study was to **understand the current landscape of the Bachelor of Science in Engineering program** at PUC Chile, and to **outline possible action courses to incentivize the Bachelor's degree as an alternative for students to enter the labor market.**
- The **main results** from the study are the following:
  1. There is a **communication gap, both with companies and students,** regarding the possibility of Bachelor graduates to enter the labor market. There is also a lack of understanding about the graduates' capabilities.
  2. Cultural biases lead companies to consider the Bachelor's degree as an **incomplete education.** However, companies are **open to the idea of hiring Bachelor graduates**. Companies appreciate the idea of hiring younger and more committed professionals but are skeptical about their job continuity and professional skills.
  3. On the other side, **students are mostly closed to the idea of starting working as Bachelors.** They fear not finding a job, not having the necessary skills and consider returning to finish the degree afterwards complicated. However, they recognize that the current program is too long and graduating as Bachelors would allow them to gain experience and income earlier.
  4. Although both companies and students state that Bachelor graduates should opt for lower salaries, expectations are very different. **Companies for the most part expect to pay much lower salaries than students are willing to accept.**
- As next steps, the university will have to decide what degree of disruption and impact it will pursue. The possible action plans vary from the development of communication plans and pilots, to the structural review of the engineering program and duration.

AGENDA

1. **Introduction to the study**
2. Methodology
3. Chilean Context & International Landscape
4. Key Messages from the Interviews & Surveys
5. Conclusions & Recommendations
6. Appendix

Introduction: Engineering at PUC Chile

- The engineering program at PUC, in effect since 2013, consists of a **dynamic and flexible curriculum that promotes interdisciplinarity, entrepreneurship and innovation in students.** It allows for the development of different profiles of engineers.
- This curriculum **also seeks to promote internationalization** in the development of students, since the first four years of the degree are equivalent to the four year structure of the Bachelor's degree in countries such as the United States.
- According to this plan, the engineering program is **mainly composed of two cycles**:
  - The **first cycle** (Bachelor of Science in Engineering) is a 4-year program. During this period, students can choose a major and minor and, in this way, deepen or broaden their knowledge in geosciences, geoengineering, biological engineering, biomedical engineering, design, innovation, architecture and mathematics, among many others. In this way, various profiles of engineers are developed.
  - The **second cycle** consists in the articulation of the bachelor program with a professional degree in Civil / Civil Industrial Engineering, for an additional 1.5 years, or with other higher academic degrees (such as Masters degree, PhD, among others).
- Upon obtaining the Bachelor's degree, **students can choose to go out into the labor market, gain some experience, and afterwards return to the university to obtain their professional degree** (for which they have up to three years). This option allows them to gain a better occupational perspective of what their area of specialization should be.

As of 2020, over 90% of students decide to embark on the full two-cycle program, completing at least 5.5 years of education to gain their professional degree or other higher academic degrees.

Introduction to the study

Main drivers for the study:

THE CLOVER INGENIERIA 2030

- The Clover 2030 Engineering Strategy, also known as project “Ingeniería 2030”, is a joint initiative between PUC Chile and UTSM[1] sponsored by CORFO[2].
- This initiative **seeks to transform its institutions’ schools of engineering into world class excellence centers,** recognized by some of the best international engineering schools and institutions.
- In order to do so, the program seeks to promote an innovative and entrepreneurial educational ecosystem, that utilizes technology as a vehicle to generate local and international impact.

In this sense, **promoting the Bachelor’s degree as a market-entry gateway is aligned with the goals of Ingeniería 2030** of promoting entrepreneurship and innovation, and of maintaining a globally connected program.

ABET

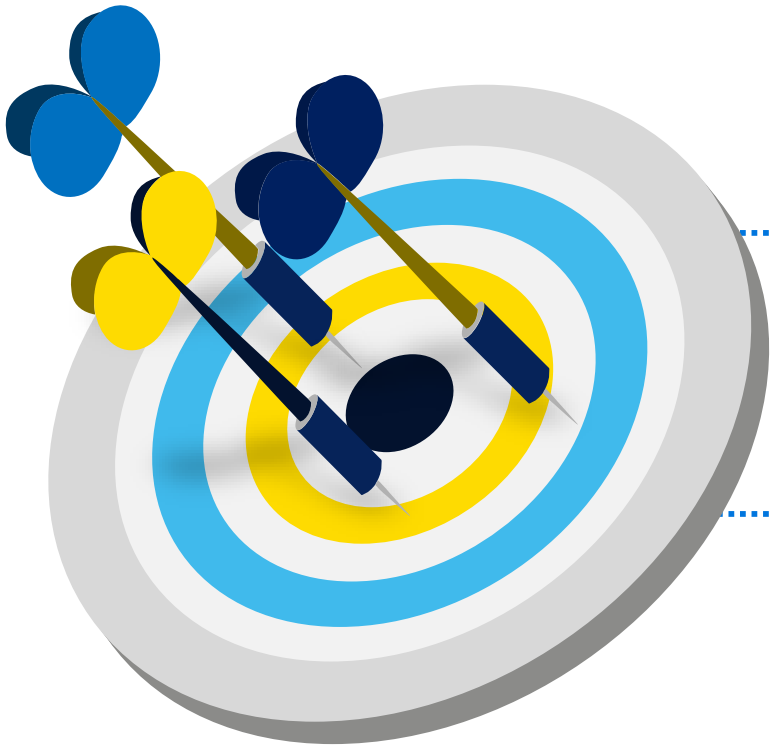
- ABET[3] (the Accreditation Board for Engineering and Technology) would be coming to the School of Engineering at PUC Chile to once more accredit its engineering program in October 2020.
- Historically, ABET has accredited the full professional engineering programs (5.5 years) as equivalent to the four years of the Bachelor's degree in Anglo-Saxon countries.
- However, in this occasion, the School of Engineering will **seek for the first time to accredit the Bachelor’s program (4 years) as the equivalent to its undergraduate counterparts in the world.**

The Employability study seeks to **reinforce the School of Engineering’s claim that the Bachelor’s program is a viable market-entry alternative** for students, and to outline what actions will be undertaken to turn this into reality.

1. Universidad Técnica Federico Santa María.
2. Corporación Nacional de Fomento de la Producción
3. ABET is a nonprofit organization that accredits college and university programs to meet the standard quality learning that produce graduates to enter a global workforce.c

Objectives of the Study

In this context, this employability study, developed co-jointly by the School of Engineering and Integration Consulting, seeks to accomplish **three main goals**:



1. To understand the current landscape of the bachelor of engineering program at PUC Chile, from the **perspective of local companies, engineering students and international references**.

2. To dive deeper into **the reasons that explain the current scenario and assess the openness from the different players to change the status quo**.

3. And finally **to outline possible action courses** that the School of Engineering could undertake to incentivize the bachelor's degree as an alternative method of entering the labor market.

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Methodology

To develop the study, four main activities were undertaken:

1. Interviews with Companies

A total of **27 interviews** were conducted with a varied sample of companies, representing different sizes and industries.

The interviews were focused on **understanding the companies' knowledge** of the Bachelors program, and their **openness to hire Bachelors** in the near future.

2. Surveys with Companies

A survey targeted to executives was sent to a wide base of PUC alumni and Integration contacts.

A total of **1,170 responses** were registered.

The objective was to gain a **more representative** notion of the companies' knowledge of the Bachelor program and their openness to hiring Bachelors in the near future.

3. Surveys with Students

A second survey was sent to all active students of the Engineering program at PUC.

A total of **842 responses** were registered.

The objective was to **understand the students' point of view** on the Bachelor's program, and their openness to opt for it as a possible entry into the labor market.

4. Global Benchmarks Review

A benchmark was built based on desk research from **+50** universities in **16** countries.

Additionally, **12 top-ranked universities** from all over the world were interviewed with 3 objectives:

1. To more deeply understand their program's structure and duration,
2. To understand at what point students enter the labor market, and
3. To gain their perspective on the challenges faced by PUC.

Methodology | Companies Interviews & Survey Summary

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All major industries are represented in the study:

Industry	% of total Large Companies in Chile	Number of Companies Interviewed	Number of Respondents from Survey
Commerce	25%	4	90
Financial	19%	4	105
Manufacturing	17%	2	66
Construction	7%	1	140
Transport	5%	2	60
Agrobusiness	4%	2	21
Mining	3%	1	86
Energy	3%	4	75
Services	3%	1	214
Telecommunications	3%	1	27
Others	10%	2	192
Start-Ups	-	3	30

Methodology | Companies' Survey Sample Summary

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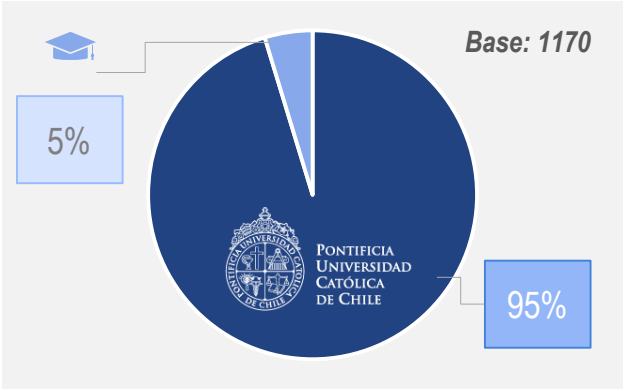
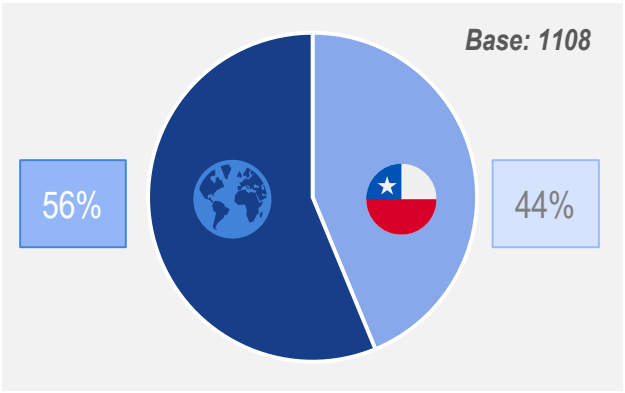
BACHELOR OF SCIENCE IN ENGINEERING

The survey sample size was of **1170**, with **95% former alumni**, **56% international firms**, **over 11 industries**, and **all sizes of firms**

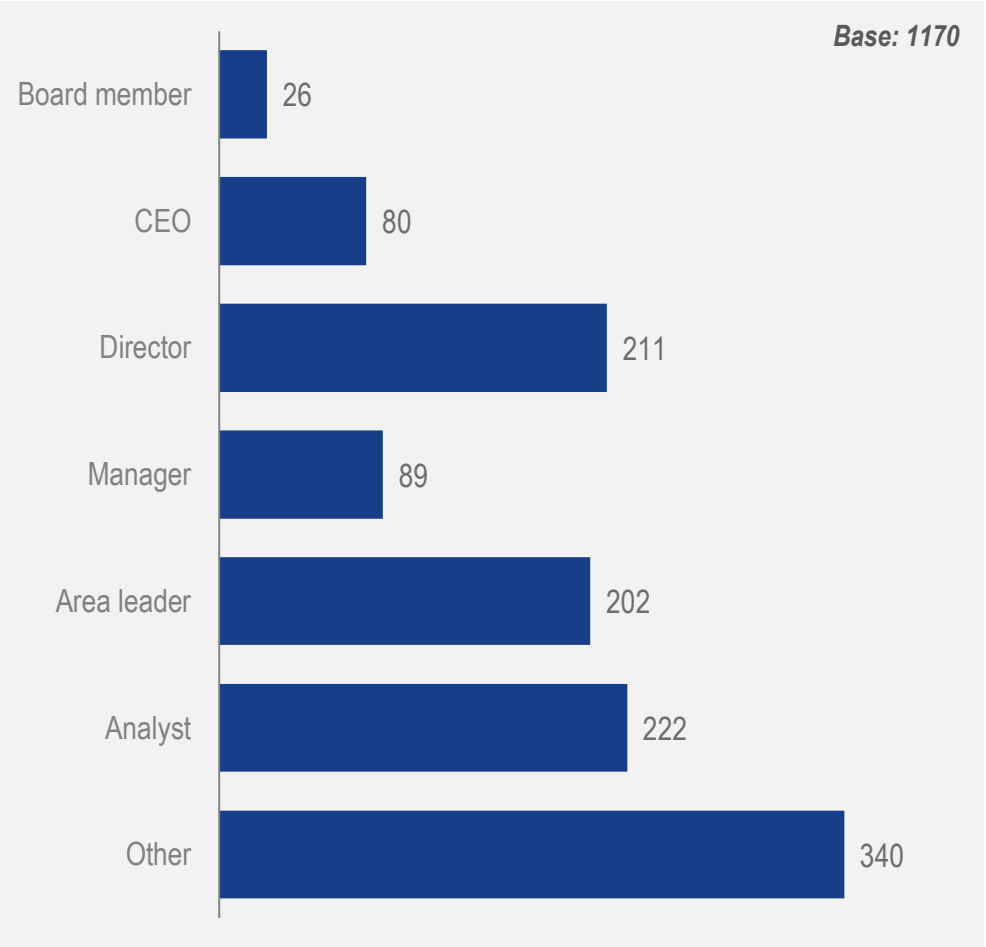
Members of PUC Alumni Community



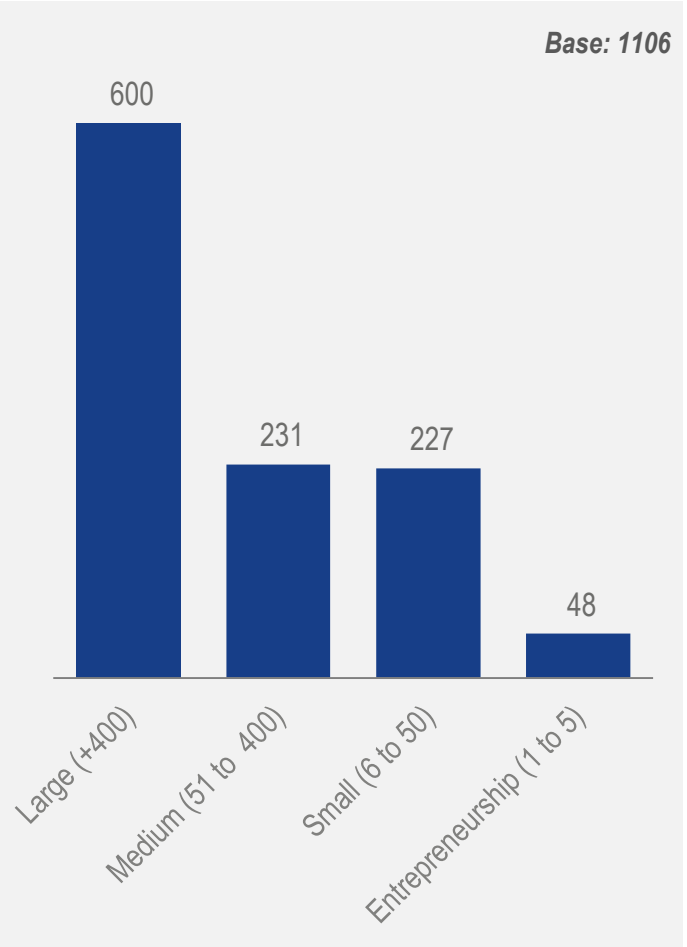
National/International Firm



Role within the company



Size of the Firm (number of employees)



*Other includes: business owner, professor, consultant, engineer

Methodology | Students' Survey Sample Summary

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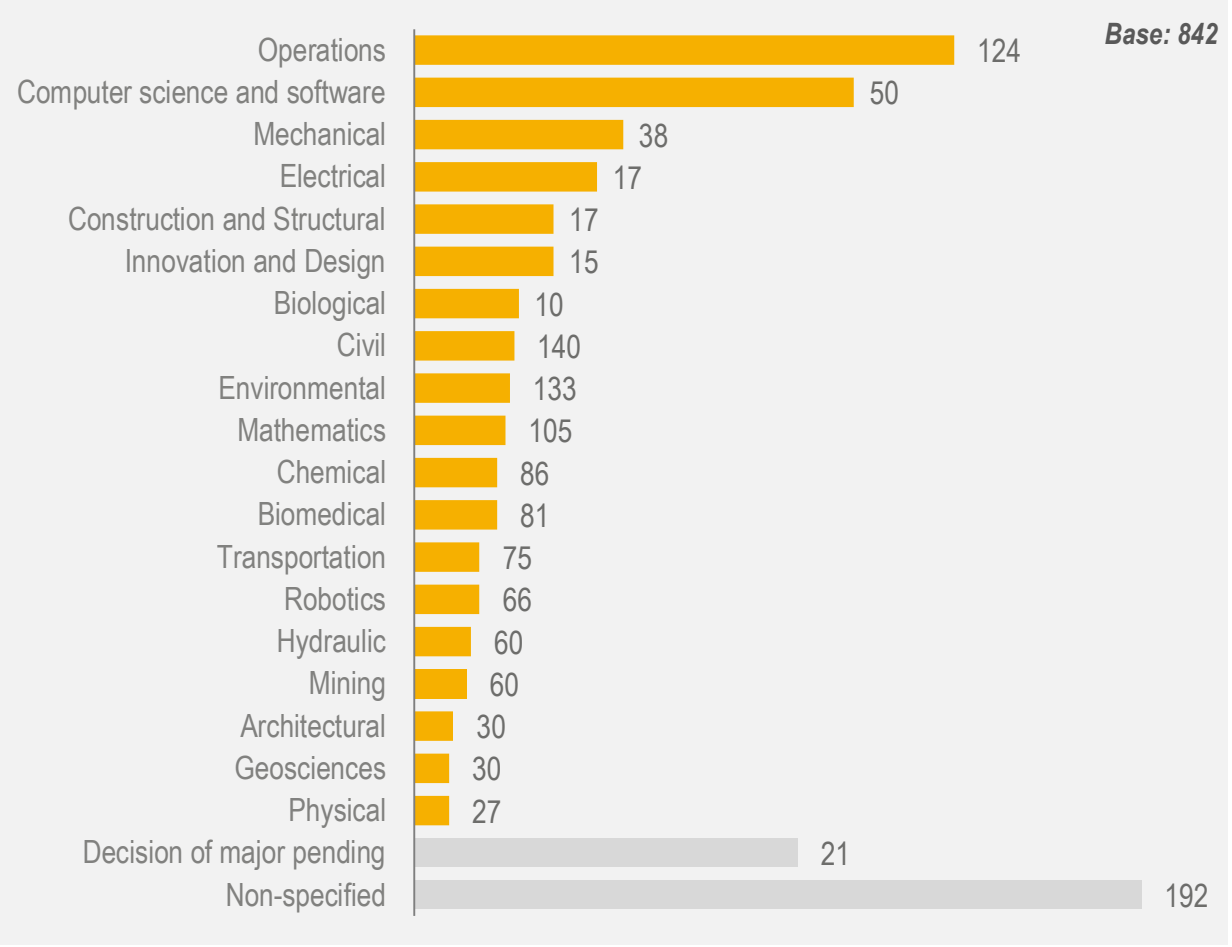
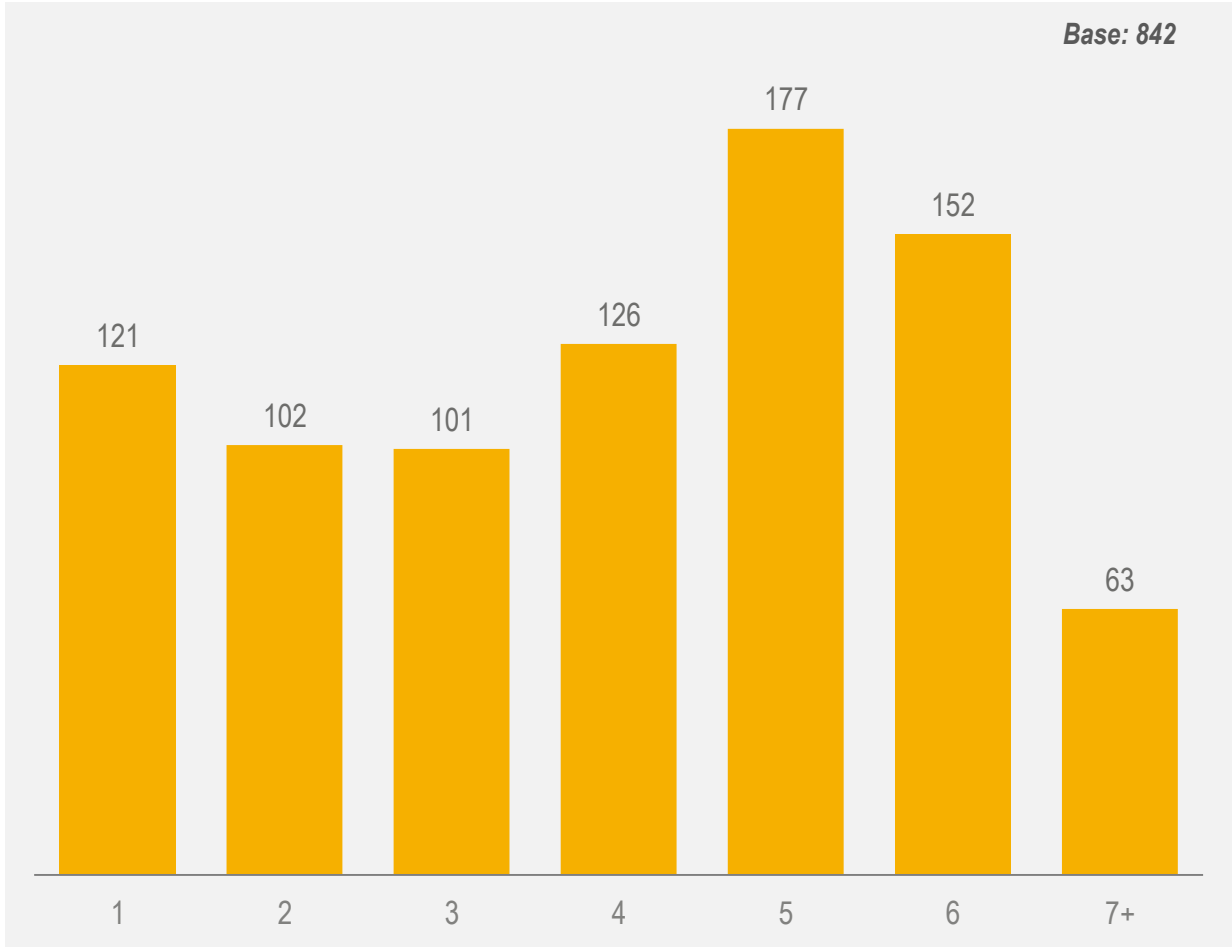
The sample consisted of **842** active PUC students from **different engineering majors**

Major



Current year



Methodology | International References

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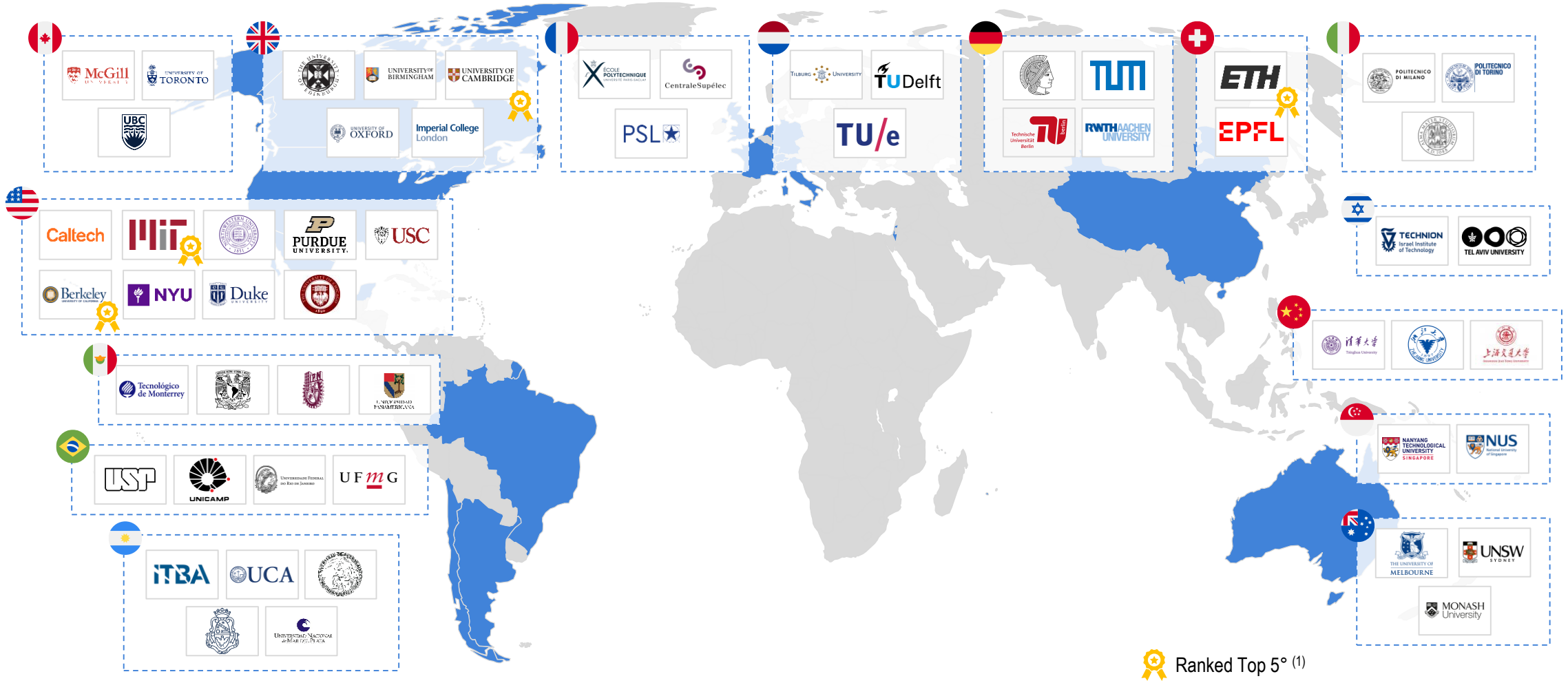
To understand the different ways in which engineering is taught in the world, we desk researched over **60** universities from **16 different countries**. From this list, a total of **12 interviews** were conducted with faculty from the universities.



(1) "University Rankings: Engineering and Technology" TopUniversities, 2020, www.topuniversities.com/university-rankings/university-subject-rankings/2020/engineering-technology

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Chilean Context & International Landscape

It's important to put the reality of the engineering program at PUC into a larger perspective, one that situates Chile with respect to the rest of the world in terms of cultural traits and educational models.

1 CULTURAL TRAITS

Understanding the **cultural characteristics of Chilean society**, to contextualize why the educational model and decisions are the way they are.

2 EDUCATIONAL MODEL

Understanding the **differences** between the Chilean model and other international models, and understanding **what path is PUC looking to follow.**

Chilean Context & International Landscape

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Chilean Context | National Culture

LA: Latin America | NA: North America | EU: European Union | ASIA: Asia

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Chile has an unequal access to university education, and high propensity for students to seek approval and live with their parents.

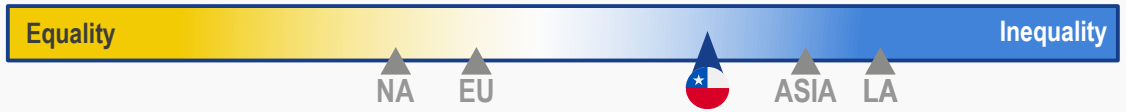
Cultural and Social Traits

Implications for Higher Education

1

- Chile is a country with a **relatively high income inequality.**
- The Gini Index[8] was 0.49 as of 2017.

Power Distance Index[1]:



- As of 2015, **only 19.5% of the population has a complete university degree**[2].
- Those that can obtain a university degree **come mostly from high income families**, and the success rates are highly influenced by income[3].

2

- Chile is a society that **highly values collectivism**[1].
- Some **"paternalistic" practices** [4] are still common in Chile[1].

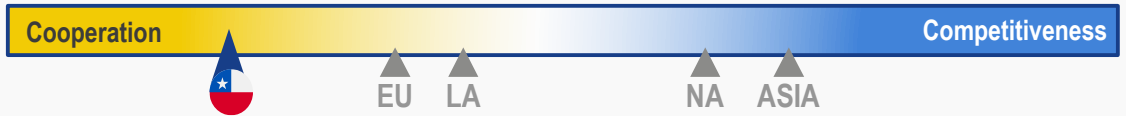
Collectivism v Individualism[1]:

- **Around 56% of university students continue living with their parents** during this period[5]

3

- Chilean culture is **highly cooperative**[1].
- **Solidarity** and **close interpersonal bonds** are highly valued[1].

Cooperation v Competitiveness[1]:



- It is common for students to **seek approval from their relatives when choosing a profession**[6].
- It is also **usually not necessary for higher education students to work while studying**, unless strictly necessary[7].

(1) Hofstede, "The six dimensions of national culture" Hofstede Insights, hi.hofstede-insights.com/national-culture
(2) Casen survey. (2015).
(3) Barrene, María et al. Acceso y permanencia en la educación superior: sin apoyo no hay oportunidad. Aequalis, 2013.
(4) Rodriguez D., Bozzo C. & Arnold M. (n.d.) Cultura organizacional e innovación. Universidad de Chile
(5) Sodexo & Youth Sight Foundation (2017) El estilo de vida universitario
(6) Carrasco E., Zúñiga C. & Espinoza J. (2014). Elección de carrera en estudiantes de nivel socioeconómico bajo de universidades chilenas altamente selectivas. *Universidad de Chile*.
(7) Cantillana R. (2018). Solo 9% de los jóvenes chilenos estudia y trabaja a la vez. La Tercera Online.
(8) Pérez, Rodrigo, and Diego Sandoval. "La geografía de la desigualdad y del poder." Ciper 26.02 (2020): 2020.
(9) Becerra Peña, Sandra. "Valores de equidad y aceptación en la convivencia de escuelas en contexto indígena" (2011).

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Chilean Context | National Culture

At the same time, Chile is a very risk averse and traditional society, in which traditional careers and universities are highly valued.

Cultural and Social Traits

Implications for Higher Education

4

- Chile is a society **highly averse to risk and uncertainty**(1).
- Chile is ranked as the **leader in the region in terms of institutionality**(2).

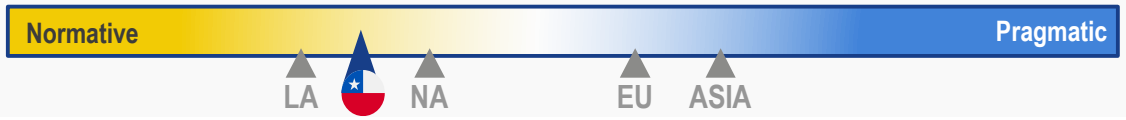
Uncertainty Avoidance(1)*:*

- Evidence suggests that **low-income families tend to be more risk-averse** towards indebtedness(5), which is relevant considering most tertiary education in Chile not free of charge.
- Several **credit mechanisms** have been designed to incentivize middle and low-income students to access university education(6).

5

- Chileans tend to exhibit **great respect for norms and traditions**(1).

Long Term Orientation(1)*:*



- It is **common for students in Chile to follow the path of traditional universities** (PUC/UCh) which are generally conceived to be better than the rest(3).
- The concept of **"traditional careers"** is also relevant and weights on the decision making of students(4)
- Norms and traditions also have an impact on the management of universities such as PUC, in which the **social doctrine of the catholic church influences institutional decisions**

(1) Hofstede, "The six dimensions of national culture" Hofstede Insights, hi.hofstede-insights.com/national-culture
(2) Casen survey. (2015).
(3) Barrene, María E. Irigoin, Rodrigo del Valle Martín, and M. Constanza Ayala Reyes, eds. Acceso y permanencia en la educación superior: sin apoyo no hay oportunidad. Aequalis, 2013.
(4) Éstas fueron las carreras por las que más se inclinaron los puntajes nacionales en la PSU. El Mercurio Online. 2019.
(5) Gambi, Mauricio Olavarría, and Claudio Allende González. "Endeudamiento estudiantil y acceso a la educación superior en Chile." Revista Española de Investigaciones Sociológicas (REIS) 141.1 (2013): 91-112.
(6) Salamanca, Juan. "El crédito como instrumento para financiar el acceso y la mantención de estudiantes en las instituciones de educación superior en Chile." Estudio de caso 52 (2000).

Chilean Context & International Landscape

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International References – Country's Reality

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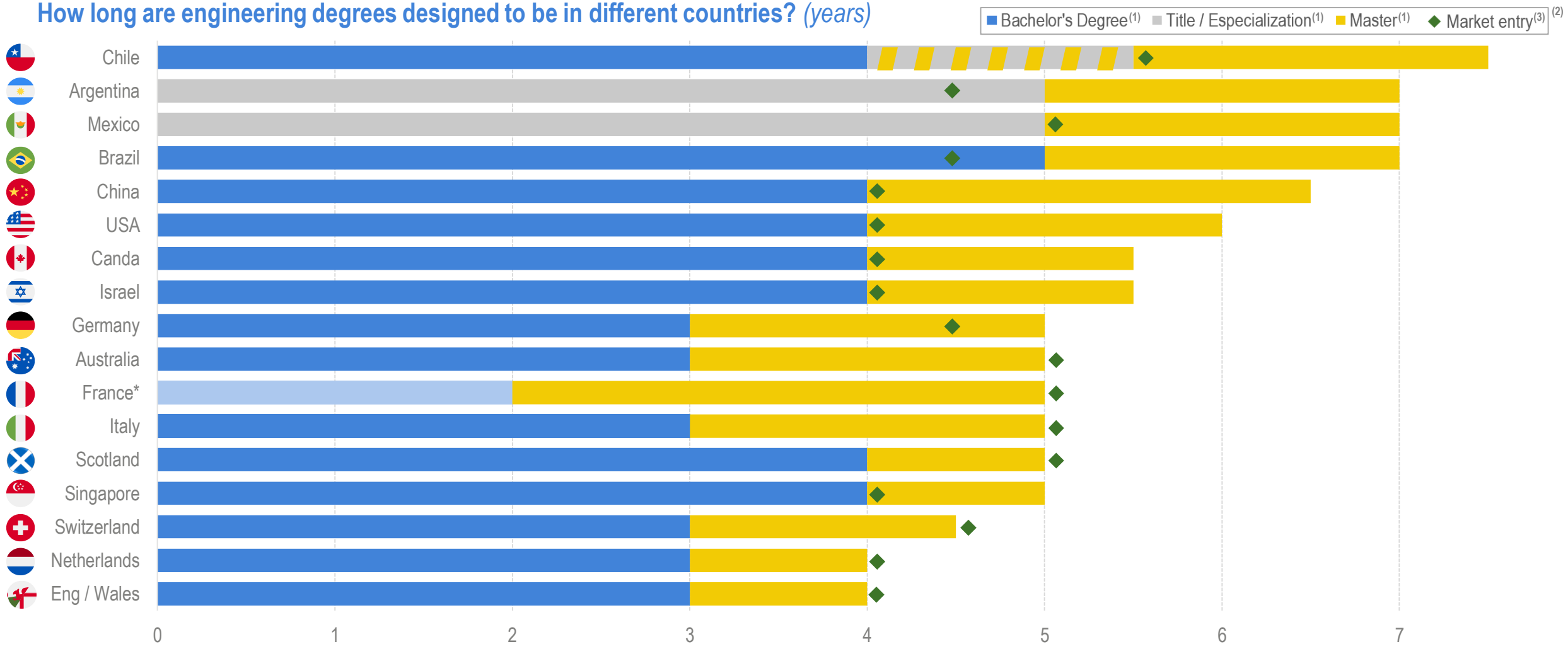
Compared to other countries of the world, engineering degrees in Chile last the longest (5,5 years), and students do not start working until they complete the entire program.

How long are engineering degrees designed to be in different countries? *(years)*



(1) OECD | *Education GPS*, gpseducation.oecd.org, Accessed 30 October 2020.
(2) Supported by institutes' curriculum
(3) Internal Interviews, Integration Consulting
*In France students receive the *Diplôme Universitaire de Technologie* after completing the first cycle.

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International References – Education System Clusters

Compared with the top engineering universities around the world, there are 3 clusters of education systems:

Education System Clusters

Number of Cycles Before Entering the Labor Market

Continuation to a second cycle

	Single Cycle Program (Bachelor/Title)	Two Cycles Program (Bachelor and Specialization/Master)
+70% Continue to a Second Cycle	**3 RETURN FOR A MASTER** Students enter the Labor Market after getting a Bachelor's Degree Over 70% of the students return to achieve a Master Degree	
<30% Continue to a Second Cycle	**2 MASTER AS A CHOICE** Students enter the Labor Market after getting a Bachelor's Degree Less than 30% of the students return to get a Master Degree	**1 NON STOP** Students enter Labor Market after getting both a Bachelor's Degrees & Specialization/Master

Armitage, Bourne, Di Simone, Jones, and Neave. "Engineering UK *Education pathways into engineering*" (2020): 107-108.
Roy, Joseph. "Engineering by the numbers." American Society for Engineering Education. 2019.
Reference: *Desk Research Integration & internal/external Interviews*

International References – Education System Clusters

Compared with the top engineering universities around the world, there are 3 clusters of education systems and PUC students are among the ones that include a two-cycle program before entering the labor market

Education System Clusters

Number of Cycles Before Entering the Labor Market

Continuation to a second cycle

Single Cycle Program
(Bachelor/Title)

Two Cycles Program
(Bachelor and Specialization/Master)

3 RETURN FOR A MASTER — +70% Continue to a Second Cycle

Tsinghua University

1 NON STOP

University of Cambridge, Imperial College London, University of Oxford, TU/e Technische Universiteit Eindhoven University, TU Delft, TUM, TU, ETH, The University of Melbourne, Universidad Panamericana, Pontificia Universidad Católica de Chile

2 MASTER AS A CHOICE — <30% Continue to a Second Cycle

NYU, McGill University, Duke University, Technion Israel Institute of Technology, USC, Universidad Nacional Autónoma de México, Tecnológico de Monterrey, ITBA, USP

3 YEARS — Cycle Duration — 5 YEARS

4 YEARS — Cycle Duration — 6 YEARS

COMPLEMENTARY MESSAGES

Students who complete a **two cycles program:**

- completing only a single program is considered a partial education
- is a necessity sought by their employers

Students starting to work at the end of a **single cycle program:**

- social environment identifies that education is sufficient
- a long program can create a barrier of entry into the labor market
- a second program is used to differentiate competition

Armitage, Bourne, Di Simone, Jones, and Neave. "Engineering UK *Education pathways into engineering*" (2020): 107-108.
Roy, Joseph. "Engineering by the numbers." American Society for Engineering Education. 2019.
Reference: *Desk Research Integration & internal/external Interviews*

International References – Education System Clusters

In summary, our research indicates that there are three main educational models:

MODEL	N° OF CYCLES BEFORE LABOR MARKET	% THAT CONTINUES TO A SECOND CYCLE	MAIN CHARACTERISTICS	EXAMPLES OF COUNTRIES / REGIONS	EXAMPLES OF UNIVERSITIES
1 NON STOP	2 cycles Bachelor + Specialization / Master	> 70% Completes a second cycle degree (Specialization / Master)	• The second cycle (master or specialization) **is seen as mandatory to start working**. It is highly valued by the labor market. • The length of the two-cycle engineering programs around Europe was standardized to be between 4 and 5 years after the Bologna Process • In Universidad Panamericana (Mexico), **students study a Specialty (1 year) after their 4 years Engineering program.** Classes are at night or in the weekends to **allow students to have full time jobs.** Graduates from other universities are welcome regardless of their work experience	Chile (PUC) European Union Australia UK Mexico	PUC Chile Cambridge Melbourne ETH Zurich Universidad Panamericana
2 MASTER AS A CHOICE	1 cycle Bachelor / Title	< 30% Completes a second cycle degree (Specialization / Master)	• **Second cycle degree (master / specialization) is seen more as an academic / research path**. Generally, it's not required by the labor market. • Since most students don't return for a second cycle degree (except for MBAs), **universities are developing online courses platforms.** • In the US and Canada, to become a licensed engineer it's required to study at least 6 years and have at least 4 years experience. **Becoming licensed is relevant only for very technical areas (such as construction engineering).** • In Canada, there is a **faculty advisory broad (leadership positions and entrepreneurs) whose** objective is to **bring insights about what the industry needs**. There is an opportunity to bringing more people to the board (today 15 people app)	Brazil Mexico USA Canada Israel	New York University Duke University McGill University Israel Institute of Tech.
3 RETURN FOR A MASTER	1 cycle Bachelor / Title	> 70% Completes a second cycle degree (Specialization / Master)	• In China, **most students must pay for their Bachelor's degree, for which they must start working early.** However, most students receive scholarships to return afterwards to get their masters, which is a valued degree in the labor market	China	Tsinghua University

*That mostly adhere to this model.

International References – Education System Clusters

Compared with the top engineering universities around the world, there are 3 clusters of education systems and PUC students are among the ones that include a two-cycle program before entering the labor market

Education System Clusters

Number of Cycles Before Entering the Labor Market

Continuation to a second cycle

Single Cycle Program
(Bachelor/Title)

Two Cycles Program
(Bachelor and Specialization/Master)

3 RETURN FOR A MASTER
+70% Continue to a Second Cycle

Tsinghua University

2 MASTER AS A CHOICE
<30% Continue to a Second Cycle

NYU, McGill University, Duke University, Technion Israel Institute of Technology, USC, Universidad Nacional Autónoma de México, Tecnológico de Monterrey, ITBA, USP

1 NON STOP

University of Cambridge, Imperial College London, University of Oxford, TU/e Technische Universiteit Eindhoven, TU Delft, TUM, ETH, The University of Melbourne, Universidad Panamericana, Pontificia Universidad Católica de Chile

3 YEARS — Cycle Duration — 5 YEARS

4 YEARS — Cycle Duration — 6 YEARS

COMPLEMENTARY MESSAGES

- In this context, the School of Engineering at PUC Chile intends to migrate from cluster 1 to cluster 2
- This would imply:
  1. **Shortening the duration of the degree,** incentivizing students to graduate after one cycle (Bachelor / title).
  2. Strengthening their **second cycle offering (masters and PhD), focused on research/academic programs**.
  3. Strengthening the **continuing education programs for the technical improvement of working professionals.**

Armitage, Bourne, Di Simone, Jones, and Neave. "Engineering UK *Education pathways into engineering*" (2020): 107-108.
Roy, Joseph. "Engineering by the numbers." American Society for Engineering Education. 2019.
Reference: *Desk Research Integration & internal/external Interviews*

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Key Messages from the Interviews & Surveys

KEY MESSAGES:

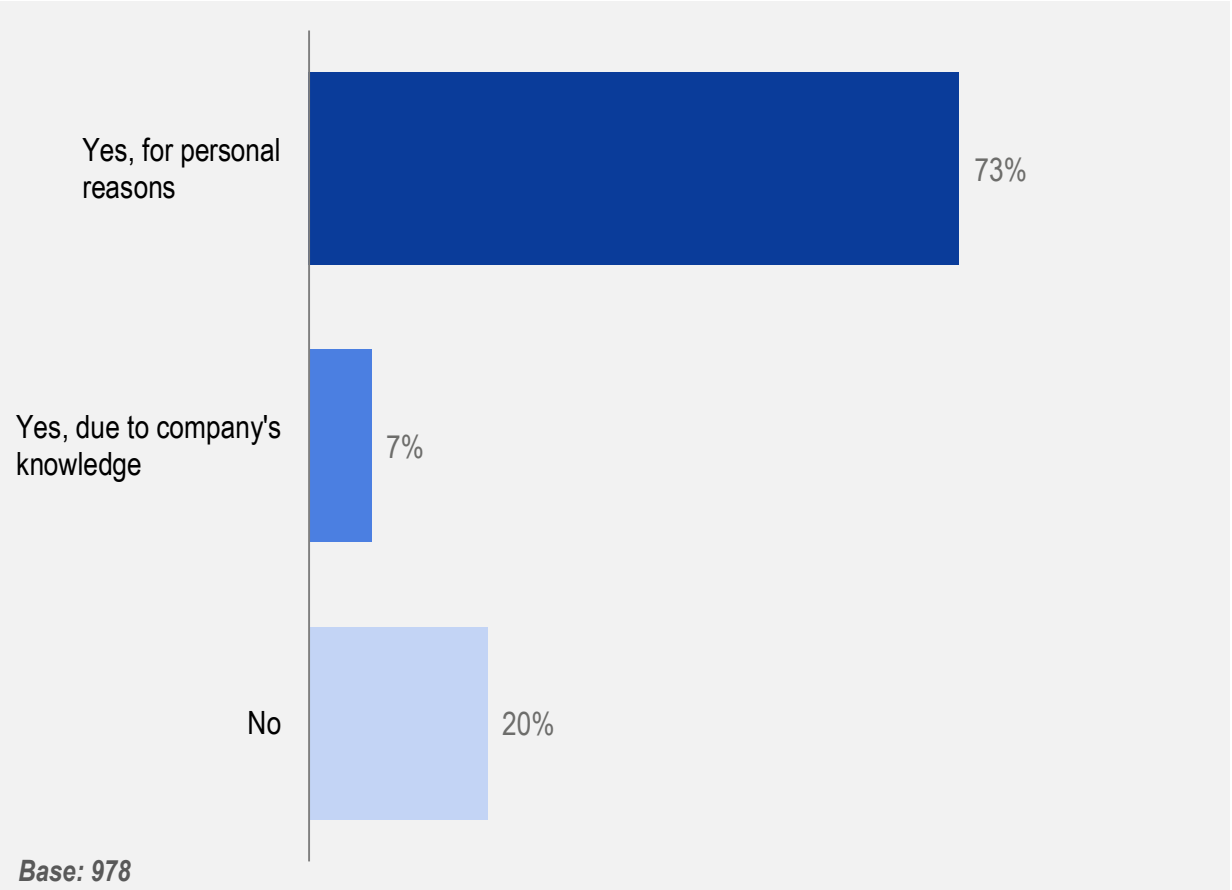
1

Even though people within different companies know about the **existence of BS in Engineering degrees**, this knowledge **depends on** their **personal backgrounds.** Also, **companies do not know whether people from such degrees can be hired**

Key Messages from the Interviews & Surveys

Even though people within different companies know about the **existence of BS in Engineering degrees**, this knowledge **depends on** their **personal backgrounds.** Also, **companies don't know whether people from such degrees can be hired**

Did you know that there's a BS in Engineering degree?



Base: 978

Did you know that you can hire graduates with a BS in Engineering?

HR Manager – Oil & Gas

*" I know the degree for personal issues, **not for a formal communication**. **I did not know that you can hire a Bachelor**"*

Recruiting Manager - Retail

*"It is known **because many studied at PUC**. I did **not know that you can actually hire them**"*

HR Manager - Financial

*"I didn't know [referring to hire a Bachelor] and **I do not know what a Bachelor offers**"*

HR Manager - Energy

*"I did not know the possibility of hiring a Bachelor ... I see an **opportunity for a better dialogue between university faculty and companies**"*

Recruiting Manager - Health

*"**I did not know it, but it does not surprise me.** The world is demanding flexibility"*

HR Business Partner - Energy

*"**I did not know it existed**. It is interesting because we are **looking for different profiles**"*

Recruiting Manager - Retail

*I was not aware of the engineering program, we considered hiring them for internships. **It has always caught my attention that they are so long**"*

*There are no large variations in responses by position, industry or alumni.

COMPANIES' SURVEY | COMPANIES' INTERVIEWS | STUDENTS' SURVEY

Key Messages from the Interviews & Surveys

KEY MESSAGES:

1

Even though people within different companies know about the **existence of BS in Engineering degrees**, this knowledge **depends on** their **personal backgrounds.** Also, **companies do not know whether people from such degrees can be hired**

This communication gap is also observed in students. **Only 23% of 1st and 2nd year students state having knowledge of the possibility of entering the labor market as a Bachelor.** For 5th year students and up the percentage increases to 61%.

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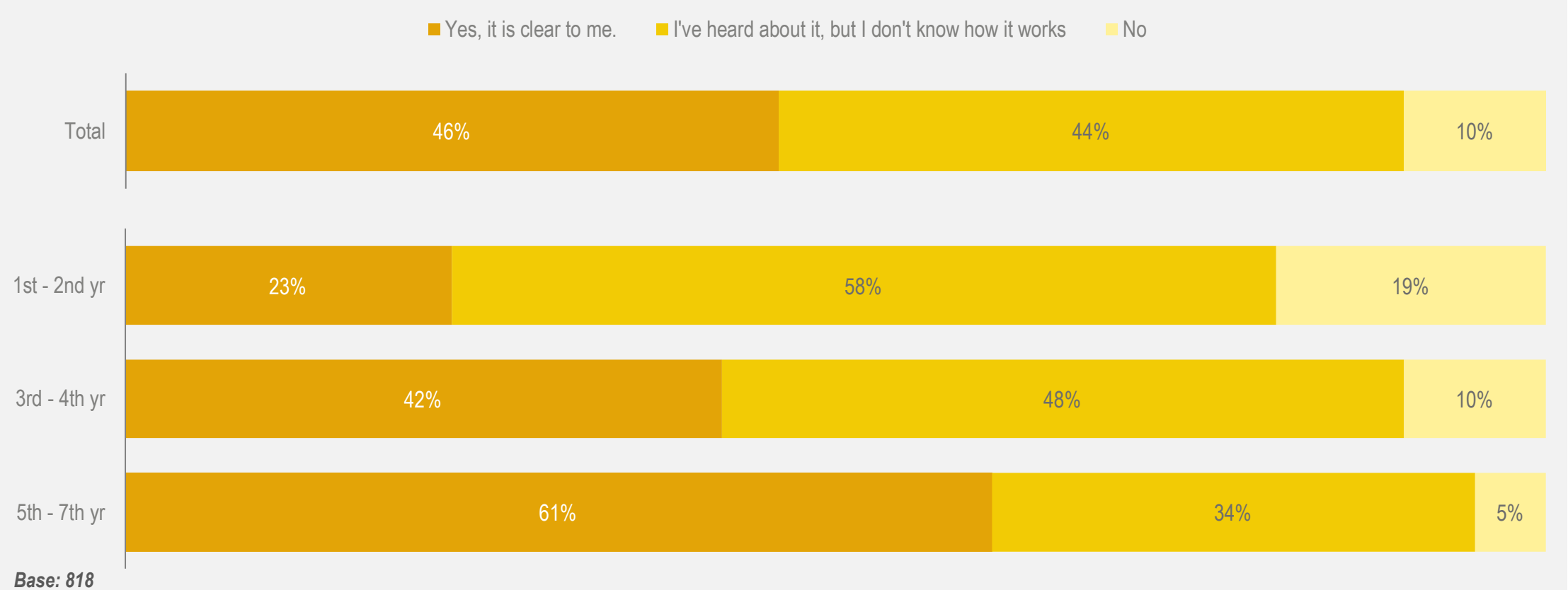
Did you know that you can go out to the labor market as a Bachelor?



Base: 818

39% of students didn't know that they could have started working as Bachelors

Key Messages from the Interviews & Surveys

EMPLOYABILITY STUDY
BACHELOR OF SCIENCE IN ENGINEERING

KEY MESSAGES:

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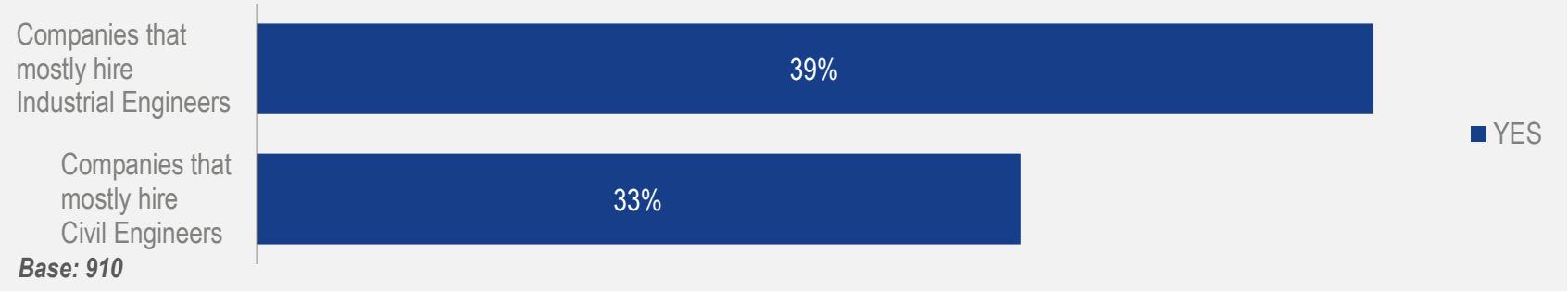
After explaining how the Bachelor's Degree works, only between **33-39%** of business respondents consider the Bachelor to be a **complete degree** on its own. However, **72% are open to the idea of hiring** a Bachelor graduate.

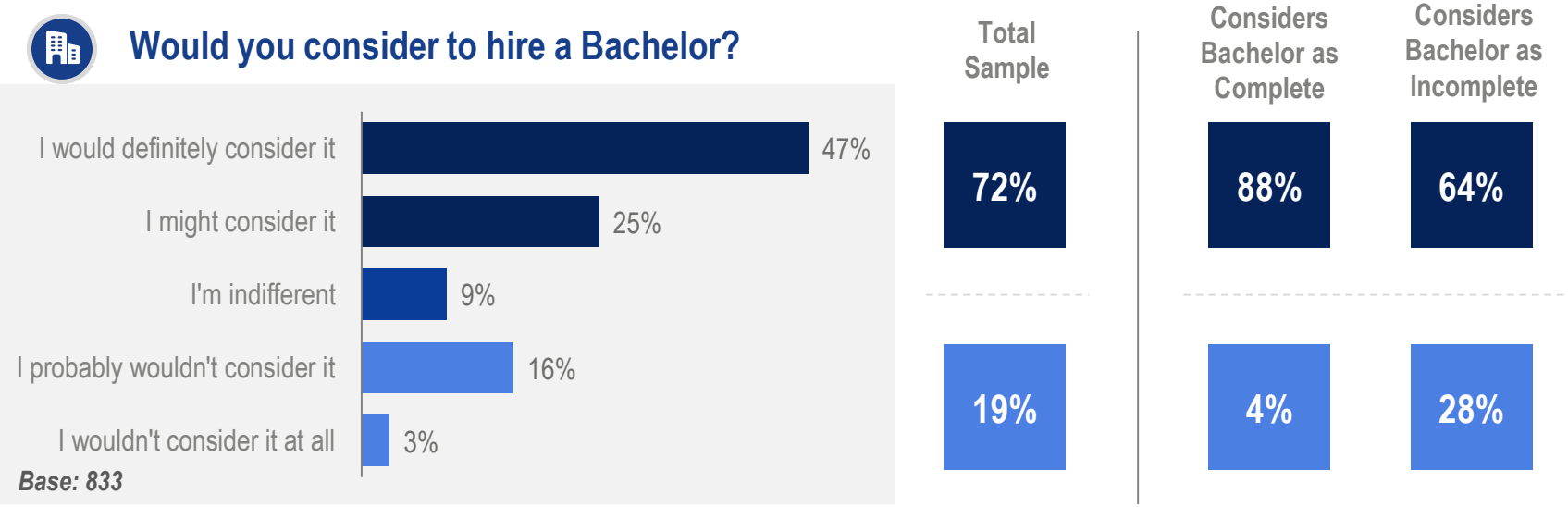
Key Messages from the Interviews & Surveys

After explaining how the Bachelor's Degree works, only between **33-39%** of business respondents consider the Bachelor to be a **complete degree** on its own. However, **72% are open to the idea of hiring** a Bachelor graduate.

Do you consider the BS in Engineering to be a COMPLETE degree on its own?



Would you consider to hire a Bachelor?



COMPLEMENTARY MESSAGES

There is not a large variation between different groups of respondents.

When asked if they would consider hiring a Bachelor graduate, those in leadership roles showed more interest:

- CEOs (52%)
- Directors (51%)
- Managers (52%)

However, people in both executive and entrepreneurship roles showed less interest in hiring graduates of BS in engineering:

- Board members (37%)
- Business owners (39%)

Key Messages from the Interviews & Surveys

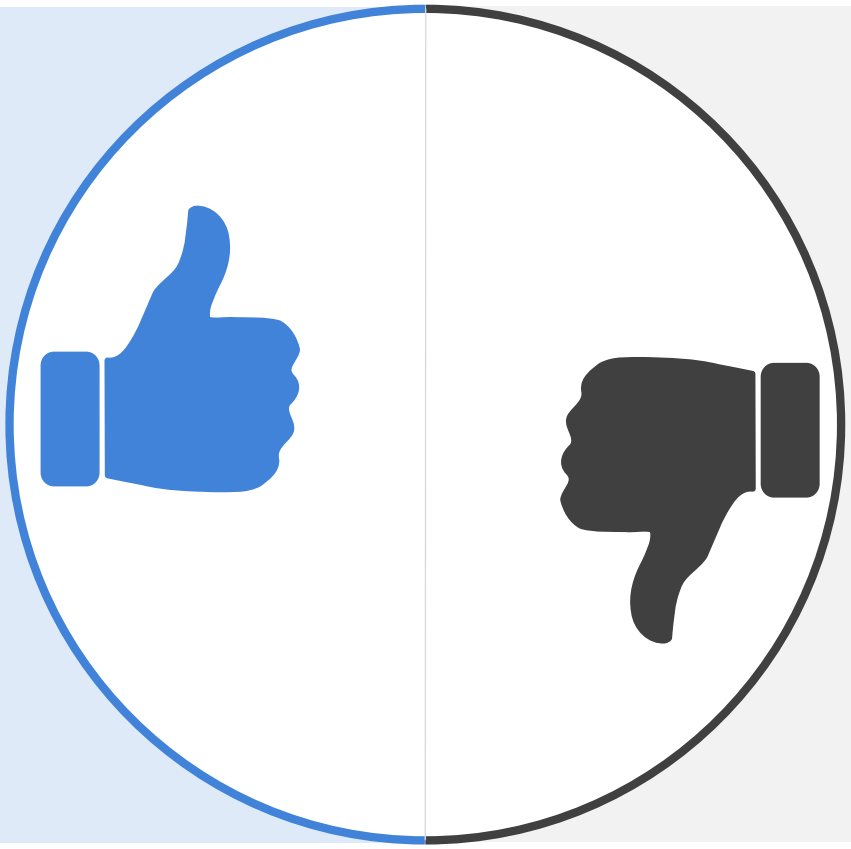
Business respondents consider the main advantages of hiring a Bachelor to be **their greater commitment and the possibility of hiring young professionals at a lower cost**. The main disadvantages **are their lack of skills and job continuity insecurity**.

What are the main advantages and disadvantages of hiring a BS in Engineering?

Top Advantages – Companies open to hiring

- **25%** More commitment
- **20%** Hire younger professionals
- **16%** Hire at lower cost
- **13%** Train future leaders

Base: 604



Top Disadvantages – Companies closed to hiring

- Not having the required skills **31%**
- Job continuity (insecurity) **25%**
- Strict requirements *(to hire engineers)* **14%**
- Lack of maturity **12%**

Base: 154

Key Messages from the Interviews & Surveys

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Hire younger professionals **20%**

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Train future leaders **13%**

Base: 604

*"Those additional years would give the company **more time to develop our future leaders**"*

Talent Acquisition Director – Consumer Goods

*"It's **easier to work with these people as we're teaching them from scratch** without needing to adjust bad habits and practices from their past experiences"*

Recruiting Leader – Retail

*"It is **cheaper to hire BS in Engineer graduates** than to hire Engineering graduates"*

General Manager - Agrobusiness

*"**Younger people always have more energy**, which is something valuable for the company"*

Talent Acquisition Manager – Consumer Goods

COMPLEMENTARY MESSAGES

Decision makers today are among those with the least **expectations** to change:

- The **lower positions** (analyst, consultant, assistant manager), are more likely to observe **advantages (91%-94%)**.
- The **higher positions** (manager, director, businessman), observe **advantages less frequently (74%-83%)**
- **Only 3%** of people **think that there are no advantages** in hiring people with a BS in Engineering degrees

Key Messages from the Interviews & Surveys

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Base: 154

*"Someone with only a **BS in Engineering is not a real Engineer**… we should only hire those have completed their studies"*

Marketing Manager – Consumer Goods

"Why would we hire Bachelors if we can always hire Engineers that are more prepared because the finished their studies?"

HR Director – Consumer Goods

*"**We don't have any clues about how good BS in Engineering graduates are**… Engineers have proved to be good"*

General Manager - Agrobusiness

*"They may **leave the company to complete their studies** and never come back"*

HR Director - Energy

COMPLEMENTARY MESSAGES

- Job continuity insecurity is the disadvantage that most senior professionals consider **(31%-35%)**
- **31%** of people **didn´t see any disadvantages** in hiring people with a BS in Engineering degrees

Key Messages from the Interviews & Surveys

EMPLOYABILITY STUDY
BACHELOR OF SCIENCE IN ENGINEERING

KEY MESSAGES:

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Even though people within different companies know about the **existence of BS in Engineering degrees**, this knowledge **depends on** their **personal backgrounds.** Also, **companies do not know whether people from such degrees can be hired**

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After explaining how the Bachelor Degree works, only between **33-39%** of business respondents consider the Bachelor to be a **complete degree** on its own. However, **72% are open to the idea of hiring** a Bachelor graduate.

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Key Messages from the Interviews & Surveys

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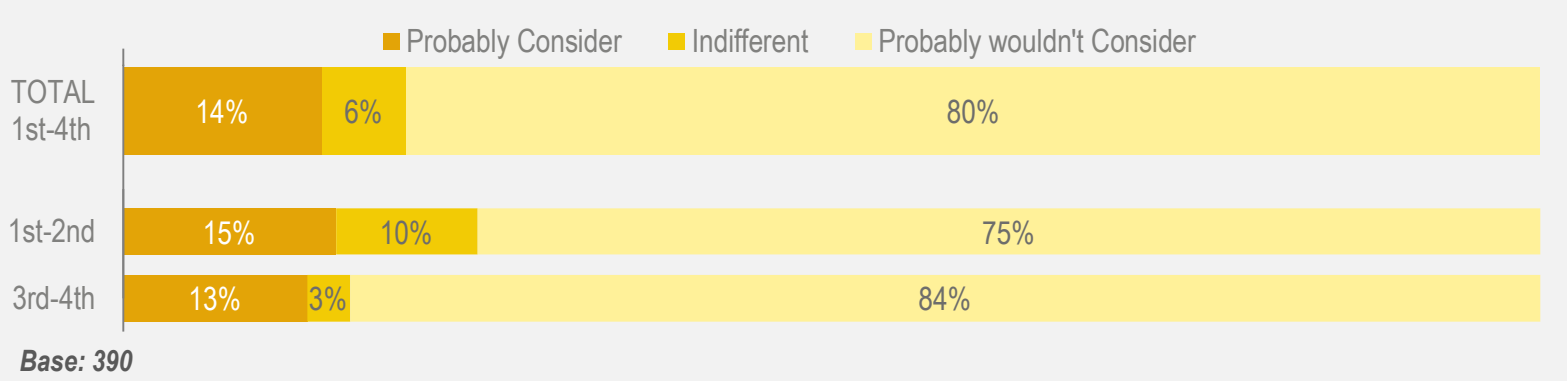
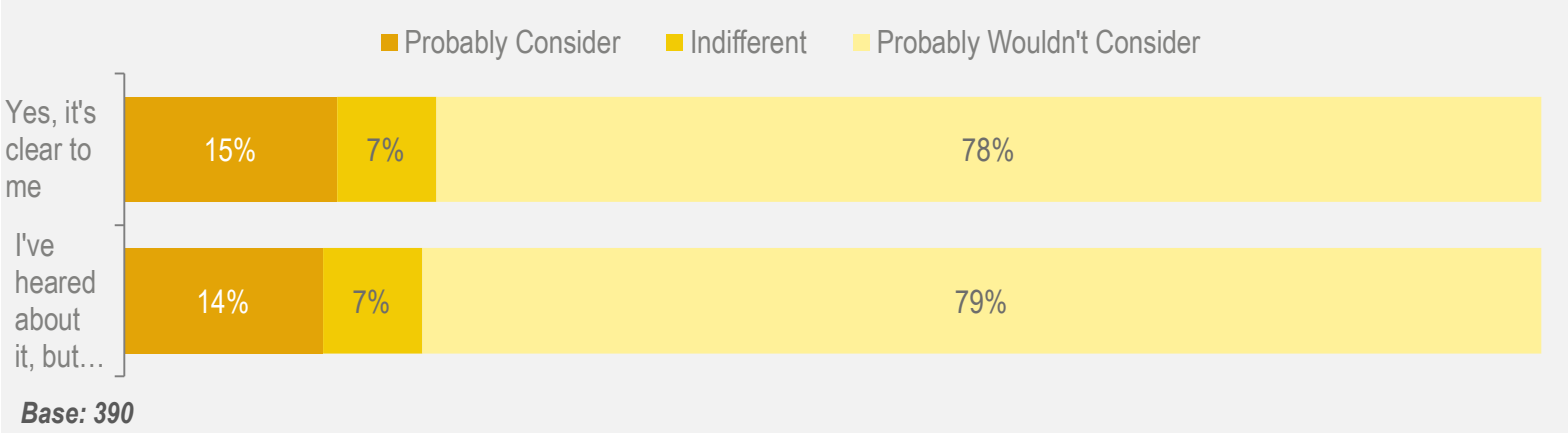
Would you consider entering the labor market after receiving a BS in Engineering?



First and second year students are **marginally more open minded** about the idea of entering the labor market as a Bachelor.



There **doesn't seem to be a direct correlation** between the level of knowledge that students have about the program and their openness to opt to it.

Key Messages from the Interviews & Surveys

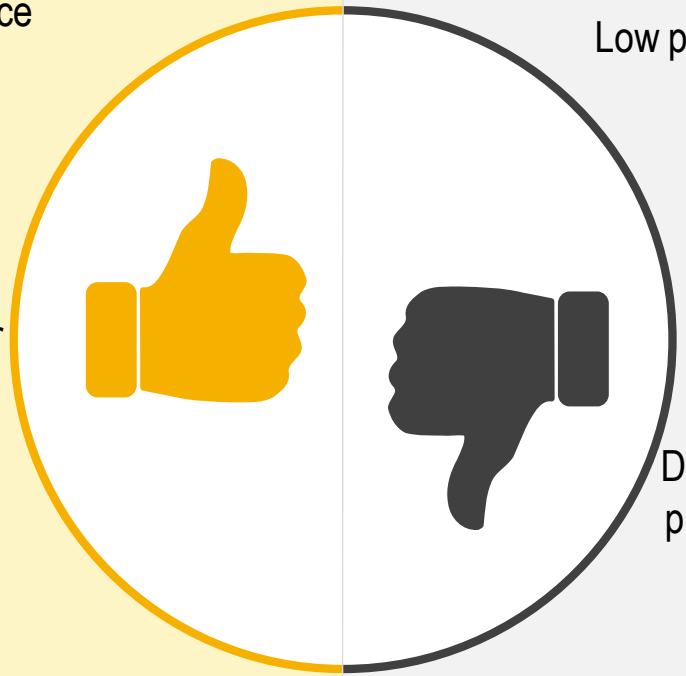
Students consider that the entire degree is too long, and that starting work as a Bachelor allows them to gain **time and experience before specializing**. At the same time, the main disadvantages observed are **low employability and difficulties to return to study.**

What are the main advantages and disadvantages of entering the labor market as a Bachelor?

TOP ADVANTAGES
Students OPEN to start working as Bachelors

- **26%** Gives time and experience before specialization
- **26%** The entire degree is too long
- **19%** Generate income sooner
- **12%** It is important to have work experience / I want to be an entrepreneur
- **5%** Other

Base: 93



TOP DISADVANTAGES
Students CLOSED to start working as Bachelors

- Low probability of finding a job **28%**
- Difficulty to return to studies **23%**
- Lack of technical expertise **22%**
- Doesn't guarantee a good professional development **18%**
- Other **10%**

Base: 588

COMPLEMENTARY MESSAGES

For students who do not find it attractive to go into the labor market, the main advantage would be to **generate income sooner (28%)**, while students that do find it attractive to go into the labor market don't mention it as much **(17%)**.

Most students that do not find the labor market attractive are most worried about not obtaining the **sufficient technical expertise (70%)** compered to those that view the labor market as attractive **(30%)**.

Key Messages from the Interviews & Surveys

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Both companies and students consider a dual modality to be **the best option for Bachelors deciding to return to the university to complete their engineering degree.** 53% of companies and 69% of students prefer this modality.

Key Messages from the Interviews & Surveys

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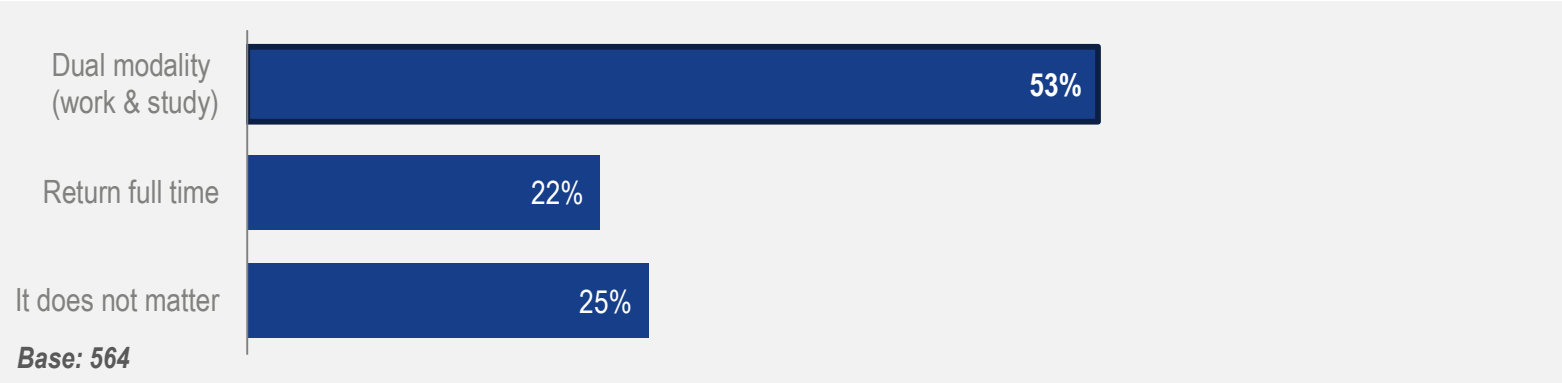
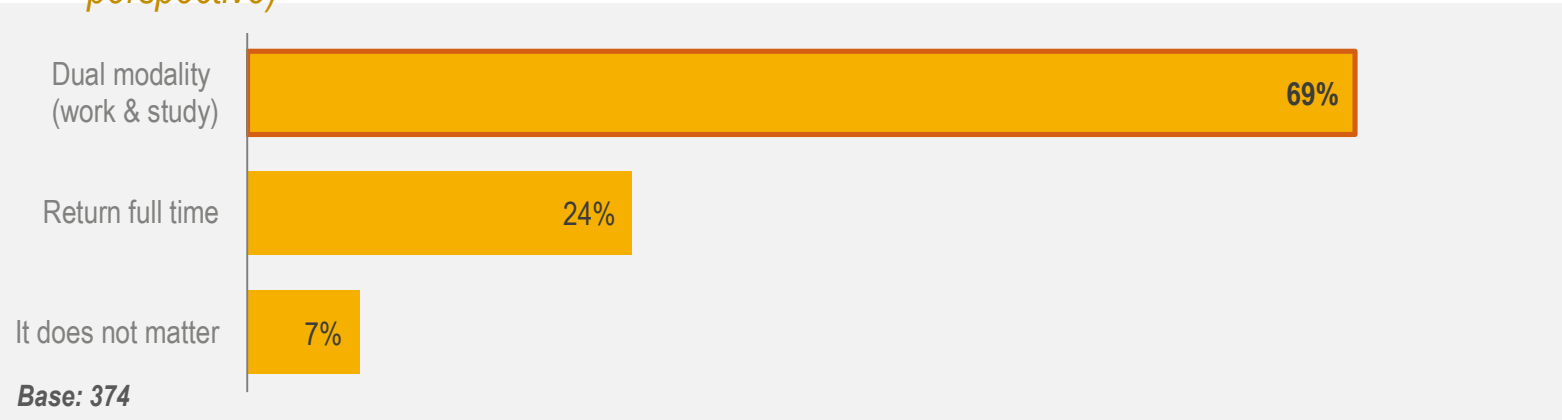
What is the best education model to obtain the Engineering Degree? *(employers' open to hiring perspective)*



What is the best education model to obtain the Engineering Degree? *(1st to 4th year students' perspective)*



COMPLEMENTARY MESSAGES

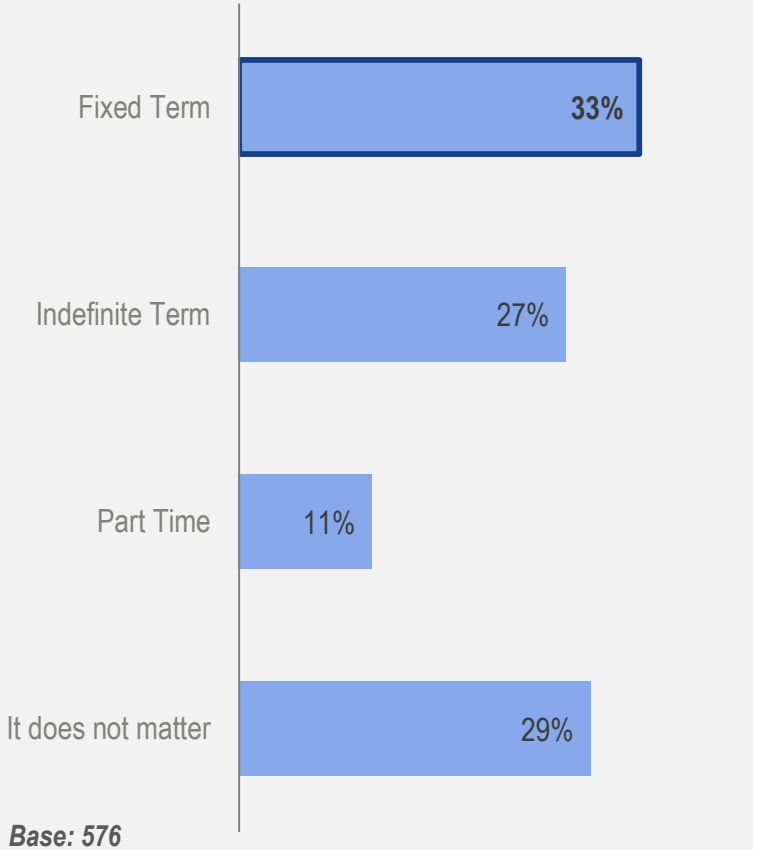
The main conditions that students request in order to consider starting working as Bachelors are:

- That **companies proactively seek Bachelor graduates** and value them similarly to engineers
- That the **university is flexible for students** to work and study.

Key Messages from the Interviews & Surveys

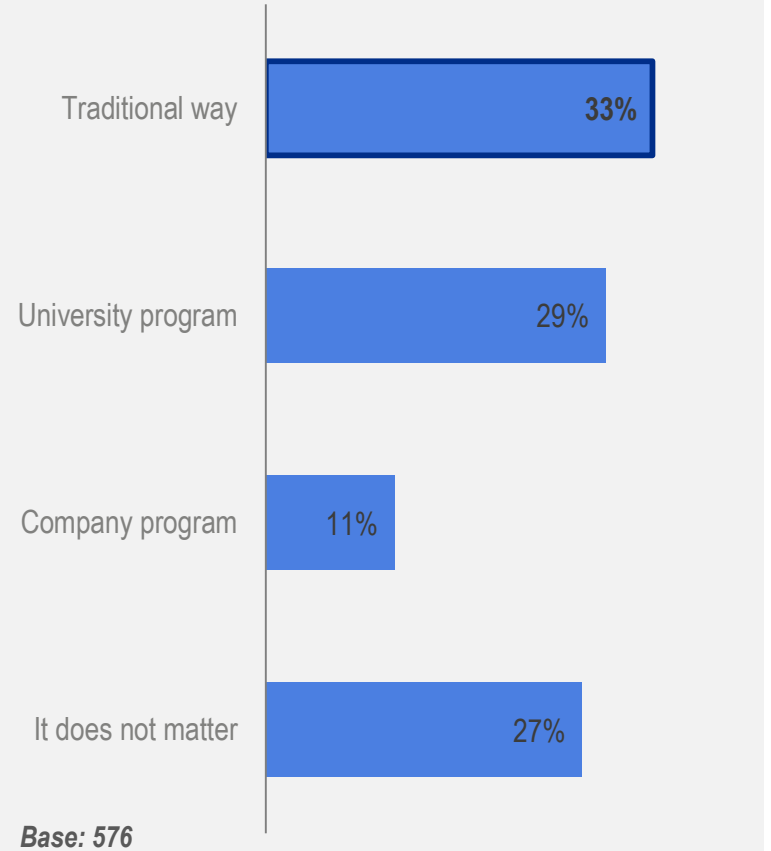
When thinking about the possibility of hiring Bachelors, companies don't seem to have strong preferences in terms of modality or working areas.

Type of Contract



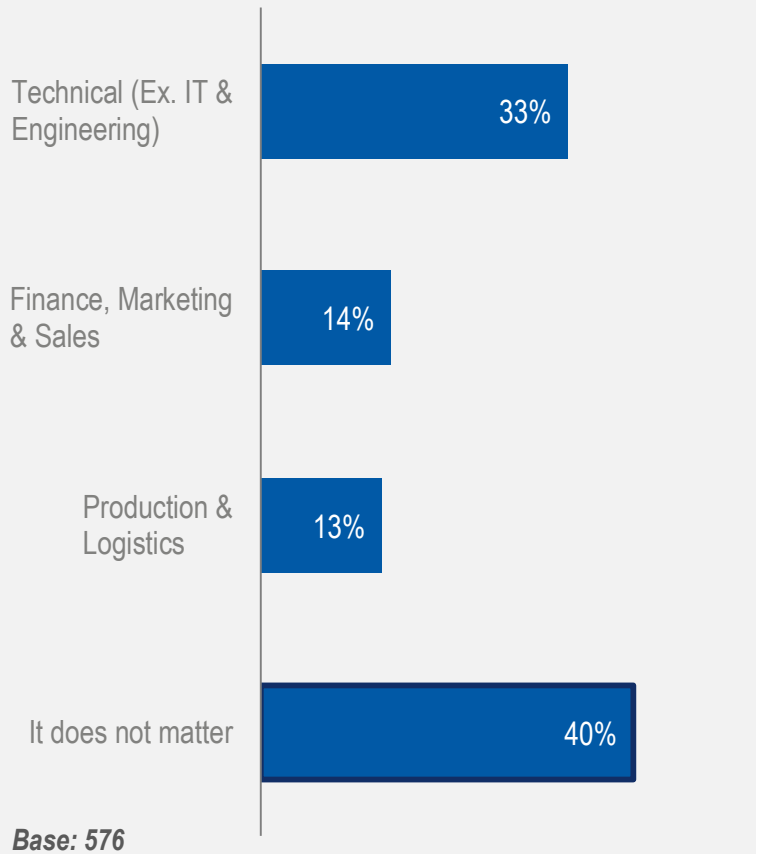
Base: 576

Hiring Process



Base: 576

Working areas for Bachelor graduates*



Base: 576

*There is a trend for companies to indicate that the best work area is their companies' own industry.

Key Messages from the Interviews & Surveys

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BACHELOR OF SCIENCE IN ENGINEERING

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Most companies consider the **Bachelor degree as inferior to the engineering degree**. At the same time, **71% of companies** think that **not obtaining the Engineering Degree would probably weigh on the professional development** possibilities of the students.

Key Messages from the Interviews & Surveys

EMPLOYABILITY STUDY
BACHELOR OF SCIENCE IN ENGINEERING

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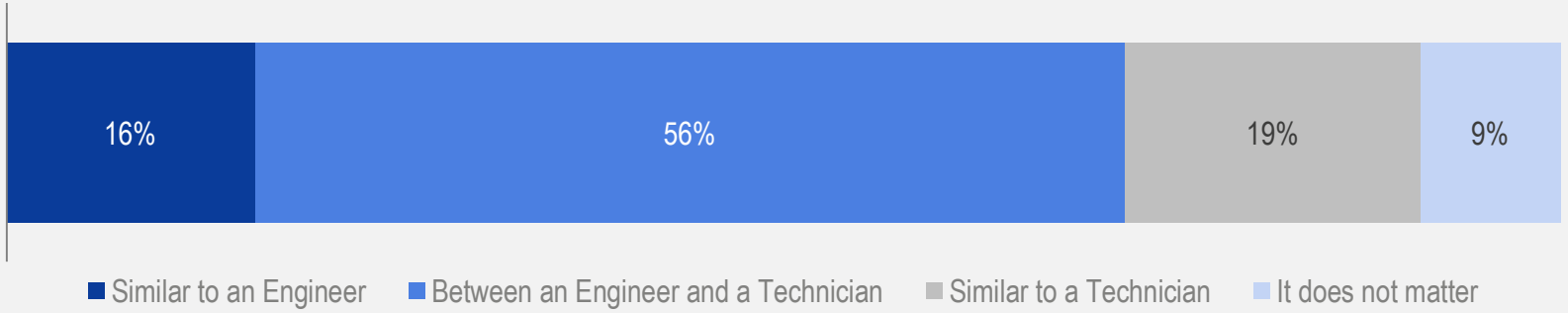
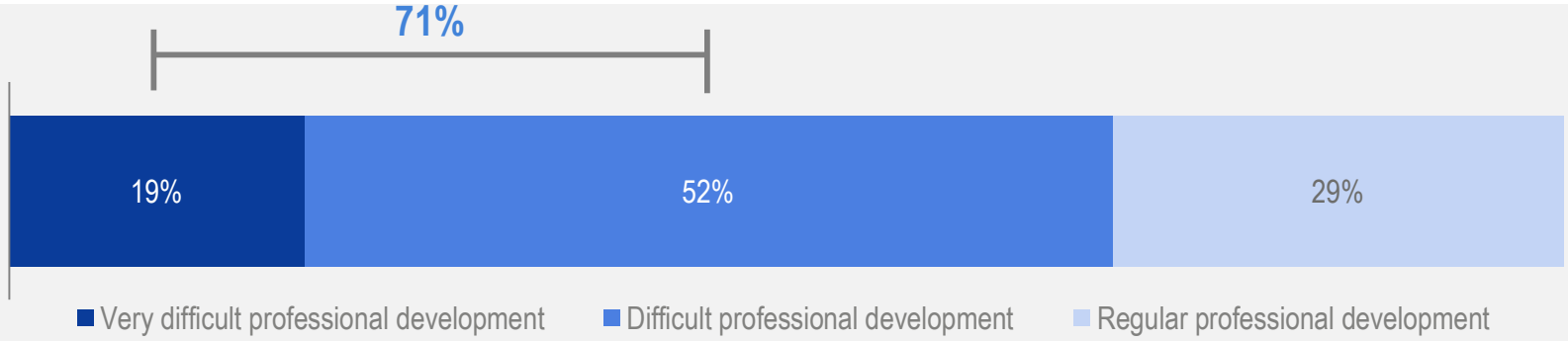
How do entry level positions of Bachelors compare to those with other type of degrees?



Base: 793

How is the professional development of professionals with a BS in Engineering?



Base: 776

How is the professional development of professionals with a BS in Engineering?

Mkt Manager- Consumer Goods

*"In order for the student to do a career, **he must get the title, it is important that he finish what he started**"*

HR Business Partner - Energy

*"[About professional perspectives] is a cultural issue, **the title is mandatory. I don't see a change in the short / medium term**"*

Talent Manager – Consumer Goods

*"it is a very cultural topic, I think the professional career **would be shorter without an engineering degree**"*

HR Manager - Energy

*"I think **it is good for them to study again**, it would make it easier for them to take on more important role. However, I think **they could continue to grow without the title, I do not see the company denying that**"*

Key Messages from the Interviews & Surveys

EMPLOYABILITY STUDY
BACHELOR OF SCIENCE IN ENGINEERING

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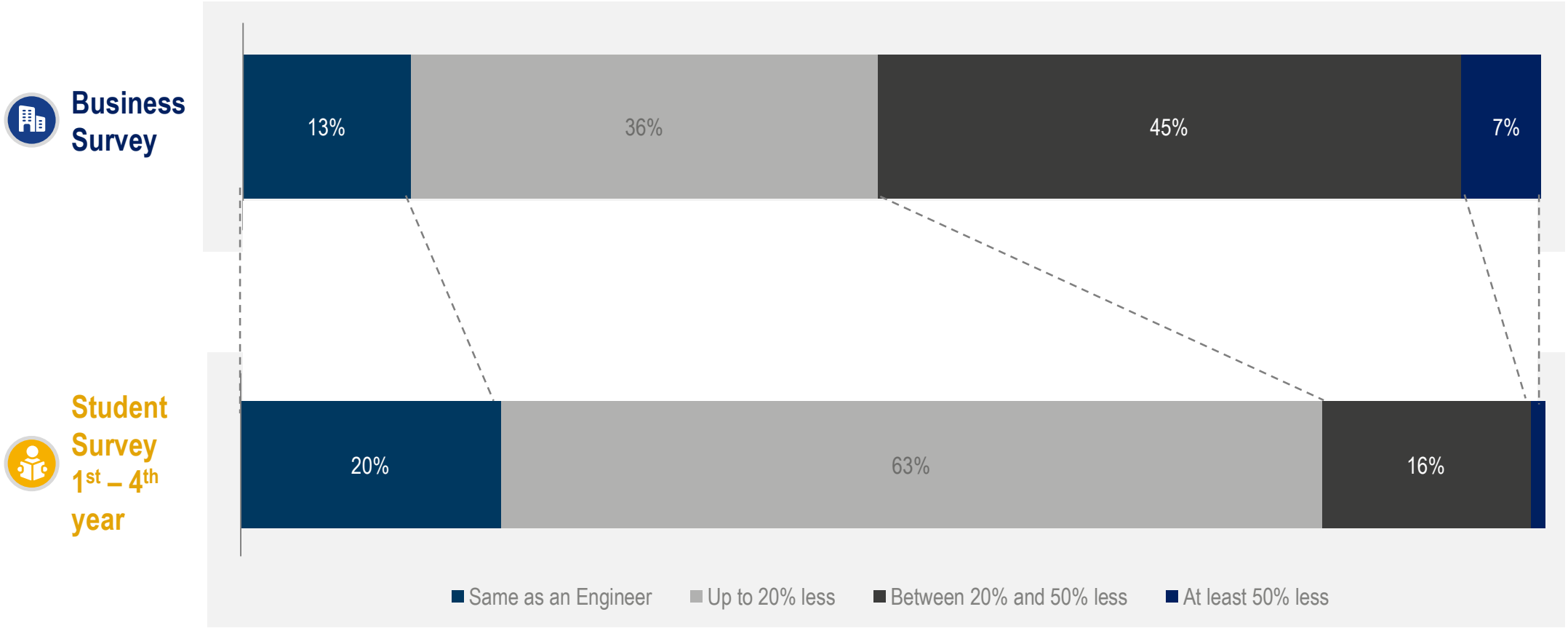
Both companies and students believe that it's **fair to receive a lower salary.** However, while 83% of students expect to get salaries **up to 20% lower than engineers**, only **49% of companies have the same expectation.**

Key Messages from the Interviews & Surveys

Both companies and students believe that it's **fair to receive a lower salary.** However, while 83% of students expect to get salaries **up to 20% lower than engineers**, only **49% of companies have the same expectation.**

How do salary expectations of BS in Engineering graduates compare to those of Engineering Graduates?



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Only **38%** of respondents **would be indifferent or prefer** hiring a Bachelor over an Engineer for a similar entry position. The main reasons are (1) a lack of understanding about the Bachelor degree advantages, (2) current beliefs and (3) over supply of Engineers

Key Messages from the Interviews & Surveys

EMPLOYABILITY STUDY
BACHELOR OF SCIENCE IN ENGINEERING

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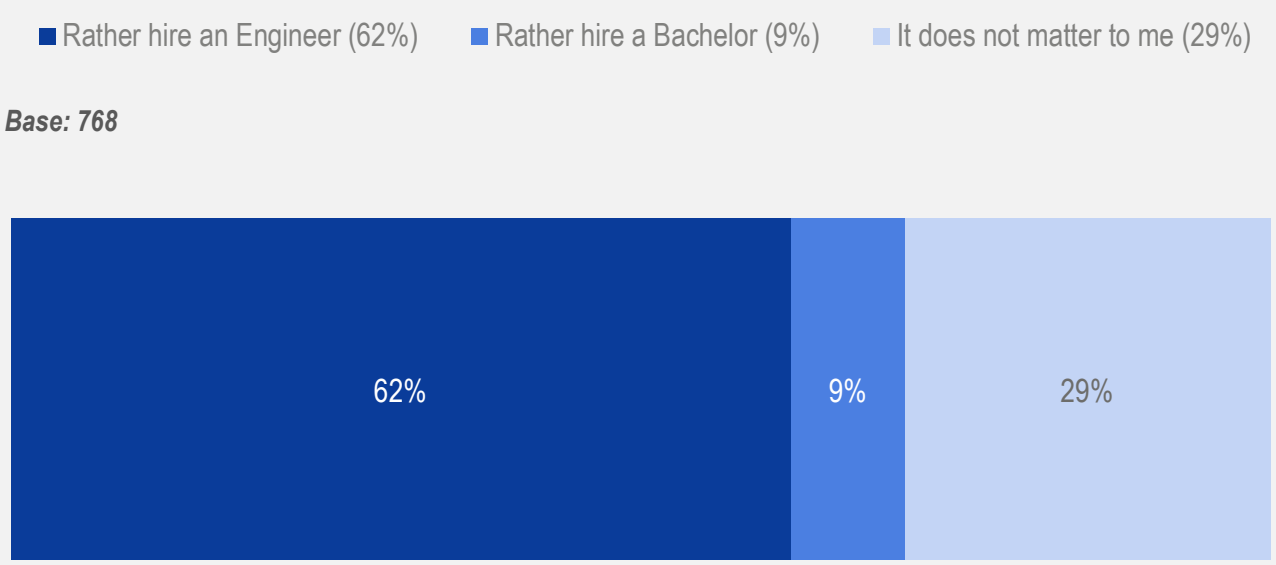
For an entry position, would you rather hire a BS in Engineering or an Engineering graduate?



COMPLEMENTARY MESSAGE

- During the interviews, **some companies commented that candidates with a BS in Engineering have the capabilities needed for entry level positions** and can compete against those with an Engineering Major.
- These **comments were mostly done by PUC graduates and entrepreneurs**; many **people didn't feel comfortable giving an answer due to their lack of knowledge** about the BS in Engineering degree.
- This **topic should be better understood in order to define an effective communication strategy** that promotes hiring BS in Engineering graduates.

Commercial Manager - Agrobusiness

"We hire according to the professional profile, if the Bachelor fits with the profile, he would have the same opportunity as the Engineer"

HR Manager - Health

"The bachelor could start in a position similar to a Business and Administration professional"

CEO - Entrepreneurship

"To enter in my company to have to have some basic knowledge and a desire to learn. I do not see differences between a Bachelor and an Engineering for a entry position"

CEO - Entrepreneurship

"I do not care if the professional doesn't have an Engineering degree. We need people who want to be constantly learning"

*This question doesn't not vary significatively depending on the companies' inclination to hire civil engineers or industrial civil engineers.

Key Messages from the Interviews & Surveys

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BACHELOR OF SCIENCE IN ENGINEERING

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Why are companies hiring Engineers over Bachelors?

COMPANIES DON'T KNOW THE BENEFITS FROM HIRING A BACHELOR

*"The title weighs, **the Bachelor is not recognized** ... what does a **Bachelor have vs a Graduate**?"*

Recruiting Manager - Retail

*"I do not really understand **how important are those final 1.5 years** "*

Recruiting Manager - Retail

*"(In order to hire BS in Engineering Graduates) I **need to know if they would make my company more efficient**?"*

Mkt Manager – Consumer Goods

*"Without a major, it is **difficult to assess how good the candidates are**"*

CEO – Agrobusiness

THERE ARE CURRENT BELIEFS THAT DIFFICULT THE COMPANIES' OPENESS TO HIRE BACHELORS

*"Engineers are recognized in Chile; **Bachelors are not**"*

Recruiting Manager - Retail

*"For us, it is **very important that candidates have an Engineering degree**"*

Talent Aquisition – Consumer Goods

*"Those without a Major **won't have a salary increase until they finish their studies**"*

HR Manager – Energy

*"We are risk adverse in Chile. **If I hire a Bachelor, it will be much harder to justify any errors**… Engineers make me feel safer, especially those from PUC""*

CEO – Entreprenurship

THERE IS A WIDE SUPPLY OF ENGINEERS, WHICH MAKES IT DIFFICULT TO VALUE THE BACHELOR

"Why a Bachelor if I can hire and Engineer?"

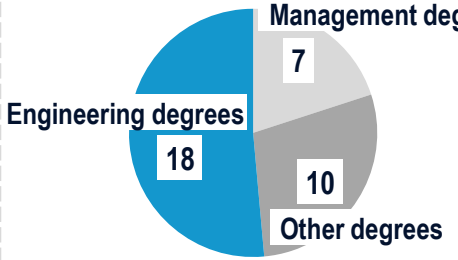
Mkt Manager- Consumer Goods

*"We receive **so many CVs from Engineers that it doesn't even make sense to look at Bachelors'"***

CEO - Entreprenurship

MOST SATURATED DEGREES IN CHILE[1]

TOTAL: 35



Engineering majors represent 18/35 most saturated degrees in Chile

Saturation refers to the amount of candidates with each degree in terms of the available positions opened to graduates of the same degree

*This question doesn't not vary significatively depending on the companies' inclination to hire civil engineers or industrial civil engineers.

(1) "¿Qué vas a estudiar?" TuCarrera, 2020, tucarrera.cl

ESCUELA DE INGENIERÍA
FACULTAD DE INGENIERÍA

Integration

Key Messages from the Interviews & Surveys

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After explaining how the Bachelor Degree works, only between **33-39%** of business respondents consider the Bachelor to be a **complete degree** on its own. However, **72% are open to the idea of hiring** a Bachelor graduate.

Only 14% of students would consider entering the labor market as Bachelors. This trend does not change among students who knew that they could start working as Bachelors; only 15% would consider starting work with that degree.

Both companies and students consider that **the best options for Bachelors deciding to return to the university to complete their engineering degree would be a dual modality.** 53% of companies and 69% of students prefer this modality.

3

Most companies consider that the **Bachelor degree is inferior to the engineering degree**. At the same time, **71% of companies** consider that **not obtaining the Engineering Degree would probably weigh on the professional development** possibilities of the students.

Both companies and students believe that it's **fair to receive a lower salary.** However, while 83% of students expect to get salaries **up to 20% lower than engineers**, only **49% of companies have the same expectation.**

Only **38%** of the respondents **would be indifferent or prefer** hiring a Bachelor over an Engineer for a similar entry position. The main reasons are (1) a lack of understanding about the Bachelor degree advantages, (2) current beliefs and (3) over supply of Engineers

AGENDA

1. Introduction to the study
2. Methodology
3. Chilean Context & International Landscape
4. Key Messages from the Interviews & Surveys
5. **Conclusions & Recommendations**
6. Appendix

Conclusions

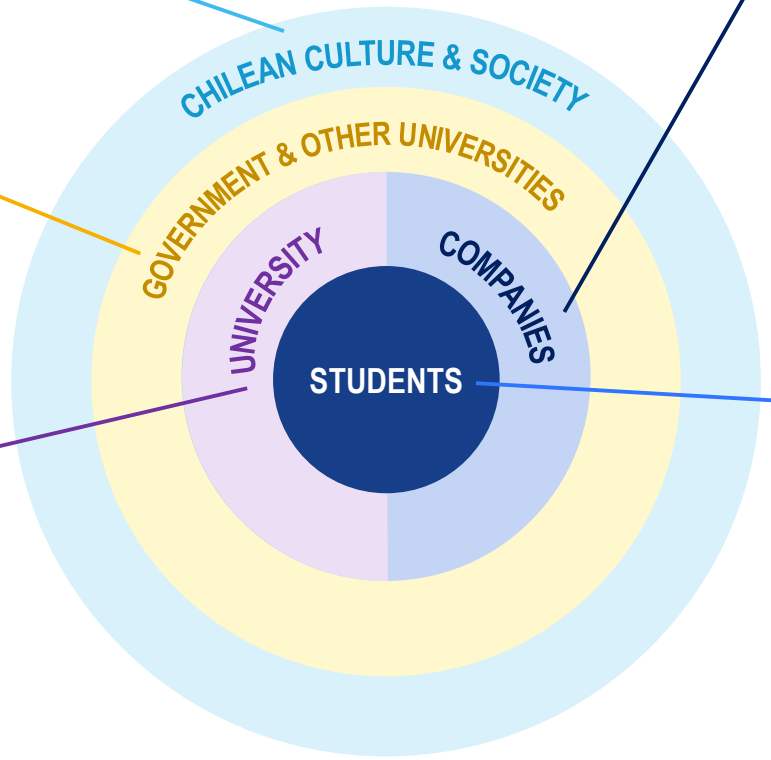
To incentivize the Bachelor degree as an alternative for students to enter the labor market, it's important to recognize that there are several **barriers** that will have to be considered:

There are **cultural elements** that will make the feasibility of implementing any changes difficult, such as:

- Influence of parents and peers on career decisions
- Weight of tradition
- Risk aversion

- Current regulation states that the duration of the program **must be at least of 5 years to be accredited.**
- There **isn't a coordinated effort among universities** to pursue adjustments in a common direction.

- Current program **doesn't consider a dual-modality** for students to return and finish their specialization, which is stated as a need both by students and companies.
- There **hasn't been effective communication** about the Bachelor's degree with companies and students.
- There is insufficient **feedback and relationship with the corporate world**, which is necessary for continuous improvement of the program.
- Lack of professional experience (**professional practice**)



Engineering Ecosystem

Although **companies** are open to the idea of hiring Bachelor graduates, there are **difficulties to consider:**

- Lack of knowledge and understanding about the Bachelor degree
- Bias towards engineers over Bachelors
- Much lower salary expectations for Bachelors
- Over-supply of engineers
- Preference for part-time return to finish the career*
- Potential difficulties in professional development for Bachelor graduates
- Doubts about the Bachelor's skills and maturity

In general, **students** are mostly closed to the idea of starting working as Bachelors, mainly because they consider several **difficulties:**

- Lack of knowledge and understanding about the Bachelor degree
- Higher salary expectations
- Preoccupation about the companies' openness to hire Bachelor graduates
- Doubts about the Bachelor as a complete and thorough education.
- Social pressure
- Potential difficulties to return to study afterwards

*Option that is currently unavailable

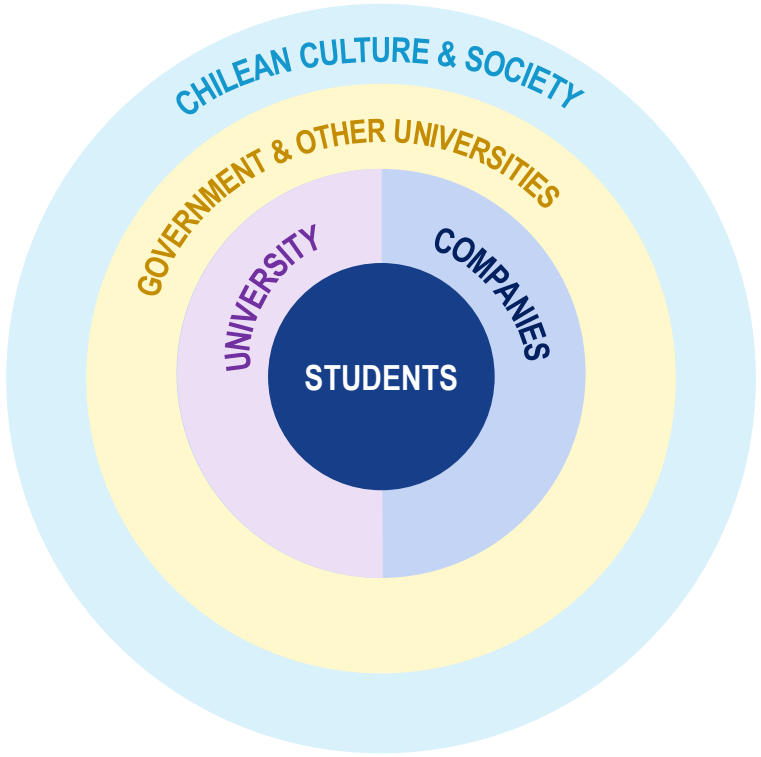
Conclusions

In order to generate change, it's important to understand that the outer layers of the ecosystem are the ones with the most potential impact. However, these levers are harder to activate. A balance between impact and actionability is necessary to maximize the chances of generating change.

CHANGES GENERATION

In order to produce the **most impactful and lasting change**, it's necessary to seek an **outside-in approach**

Only in this manner will the incentives be shifted strongly enough to incentivize a change in behavior



Engineering Ecosystem

+ IMPACT

- IMPACT

LEVER

- CHILEAN CULTURE & SOCIETY
- GOVERNMENT & OTHER UNIVERSITIES
- UNIVERSITY PROGRAM
- COMPANIES PERCEPTION & MOTIVATIONS
- STUDENTS PERCEPTION & MOTIVATIONS

*Option that is currently unavailable

Conclusions

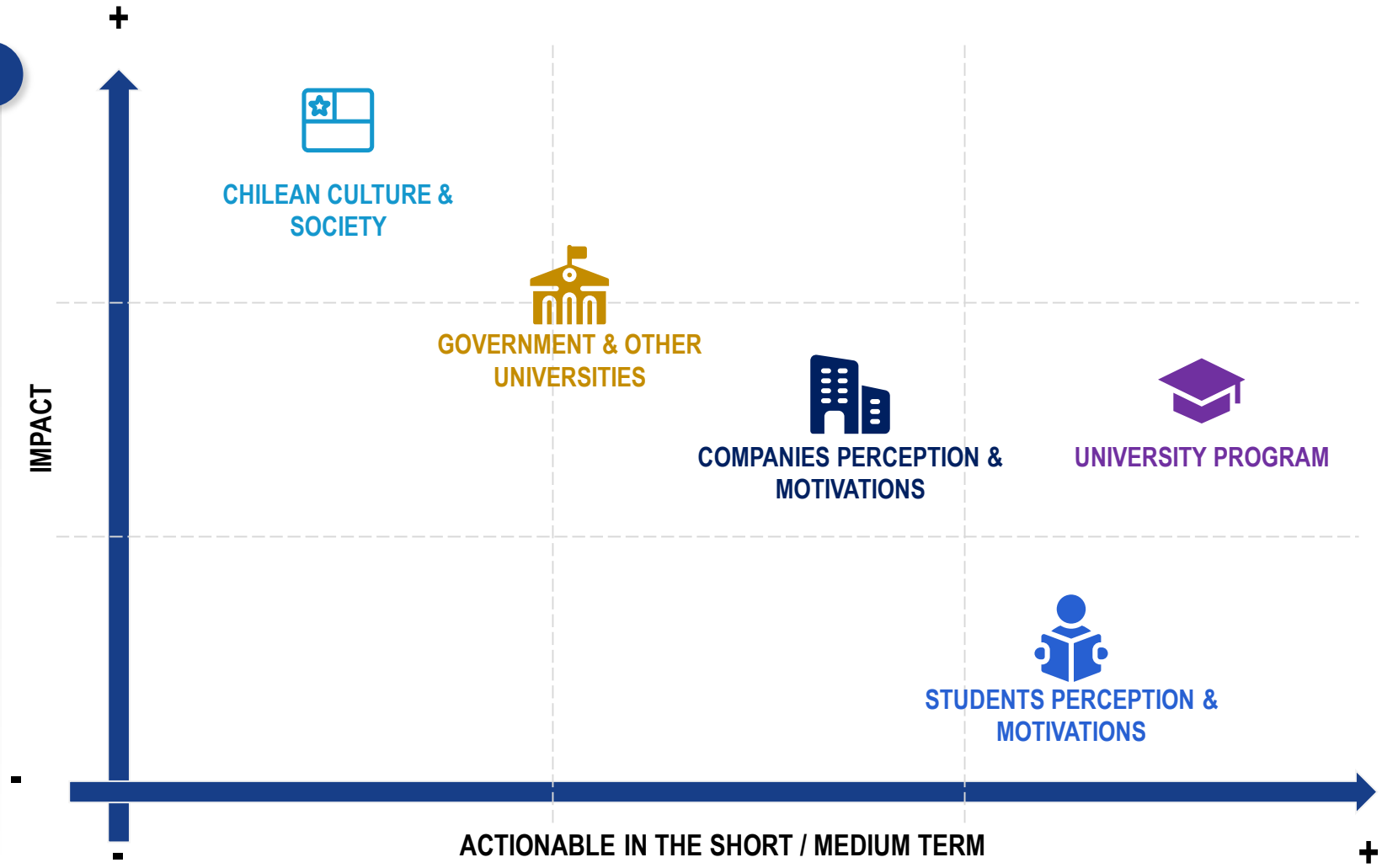
In order to generate change, it's important to understand that the outer layers of the ecosystem are the ones with the most potential impact. However, these levers are harder to activate. A balance between impact and actionability is necessary to maximize the chances of generating change.

CHANGES GENERATION

In order to produce the **most impactful and lasting change**, it's necessary to seek an **outside-in approach**

Only in this manner will the incentives be shifted strongly enough to incentivize a change in behavior

However, the levers are not equally actionable. Some are actionable in the short term while others in the long term



*Option that is currently unavailable

Recommendations

EMPLOYABILITY STUDY
BACHELOR OF SCIENCE IN ENGINEERING

Considering the landscape, the School of engineering has four potential courses of action to incentivize the Bachelor degree as an alternative for students to enter the labor market:

Potential level of impact: - +

		DESCRIPTION	IMPACTED LEVERS
1	COMMUNICATION IMPROVEMENT	• Review the **communication strategy with companies**, students and society to give visibility to the Bachelor's degree and its characteristics. • **No changes in the current program / scheme**.	
2	PROGRAM ADJUSTMENTS	• Review the communication strategy as stated in point 1. • **Map the necessary changes in the program*** based on an understanding of the competences required by the Bachelor and feedback from companies and students.	
3	INCENTIVES	• **Implement INCENTIVES to the engineering program structure**, such as: ○ Requiring work experience to continue after the four years to specialize / gain a Master's degree. ○ Government incentives to promote bachelor employability	
4	STRUCTURAL CHANGES	• **Implement drastic changes to the engineering program structure**, such as: ○ Change the program at a governmental level, so that the standard engineering title is the 4-year program.	

*Option that is currently unavailable

Recommendations

Considering the landscape, the School of engineering has four potential courses of action to incentivize the Bachelor degree as an alternative for students to enter the labor market:

Potential level of impact: - +

		DESCRIPTION	IMPACTED LEVERS
1	COMMUNICATION IMPROVEMENT	• Review the **communication strategy with companies**, students and society to give visibility to the Bachelor's degree and its characteristics. • **No changes in the current program / scheme**.	
2	I AD		
3	INCENTIVES	○ Requiring work experience to continue after the four years to specialize / gain a Master's degree. ○ Government incentives to promote bachelor employability	
4	STRUCTURAL CHANGES	• **Implement drastic changes to the engineering program structure**, such as: ○ Change the program at a governmental level, so that the standard engineering title is the 4-year program.	

It's important to highlight that only by pursuing the **most structural changes (path 3 or 4)** will the university **maximize the chances of producing a lasting change** in students' behavior. However, considering the current situation, **a program adjustment (path 2) is recommended in the short term**

*Option that is currently unavailable

Recommendations

According to the decided pathway, there will be a series of activities to execute in order to increase the potential impact of the activities.

Potential level of impact: - to +

		EXAMPLES – ACTIVITIES TO EXECUTE
1	COMMUNICATION IMPROVEMENT	• Focus groups with user areas in companies and with students to define a communication strategy. • Pilot Bachelors hiring program with interested companies. • Mass communication of the program targeting companies, students and the general public.
2	PROGRAM ADJUSTMENTS	• Focus groups with user areas in companies and with students to define a communication strategy and understand the necessary competences of the Bachelor graduate. • Design and implement program adjustments*. • Pilot Bachelors hiring program with interested companies. • Mass communication of the program targeting companies, students and the general public.
3	INCENTIVES	• Understand incentives that could be done • Focus groups with companies to understand impacts • Focus groups with students to understand impacts • Prioritization • Implementation
4	STRUCTURAL CHANGES	• Alliances with universities. • Define a governmental project and needs • Implement the project as a government project

*Some potential changes are: Dual modality for Bachelor graduates to finish their specialization. Including project evaluation as part of the Bachelor curriculum. Including a professional practice / internship as part of the Bachelor program. Considering experience as credits for the completion of the specialization or masters.

AGENDA

1. Introduction to the study
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Appendix:

- **About Integration Consulting**
  - Companies' Survey: Detailed documentation
  - Students' Survey: Detailed documentation

25 YEARS

- **9 offices**
- Local teams comprising **25 nationalities**
- Only full-time professionals, **qualified in our methodology**
- Projects delivered in **75 countries**

1995 SINCE

+800 CLIENTS

+300 PROFESSIONALS

Integration is a strategy and management consultancy

that leverages the Human Factor* to drive sustainable change.

*Human Factor: A field of knowledge developed by researchers and authors Luis Antonio Ervolino, Ph.D., and Amelia de Carvalho e Silva, M.A., and applied and licensed by Integration through the company Factor Huma as the ID One Methodology® - Human Factor.

We Offer Our Clients

BESPOKE SOLUTIONS

Methodologies can be repeated, but objectives and contexts are always different ...

Our point of view is that despite having completed hundreds of similar projects—each one stands alone …

And every project demands a bespoke solution ...

that

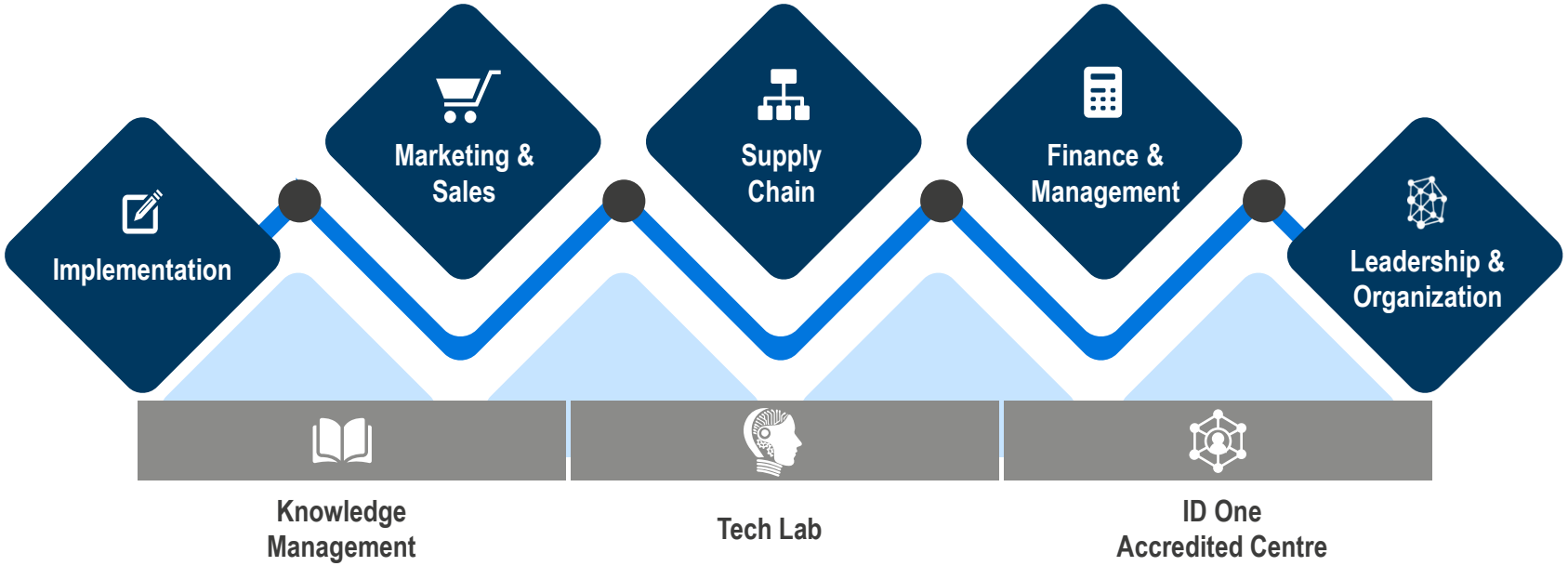
considers the reality and context of the moment you are in;

is not a “copy/paste” of a solution given to another client;

does not consist of bringing a model from outside of your country’s reality to try and reuse it;

bases solutions on needs, not interests.

PRACTICES AND COMPETENCE CENTERS



Some of Our

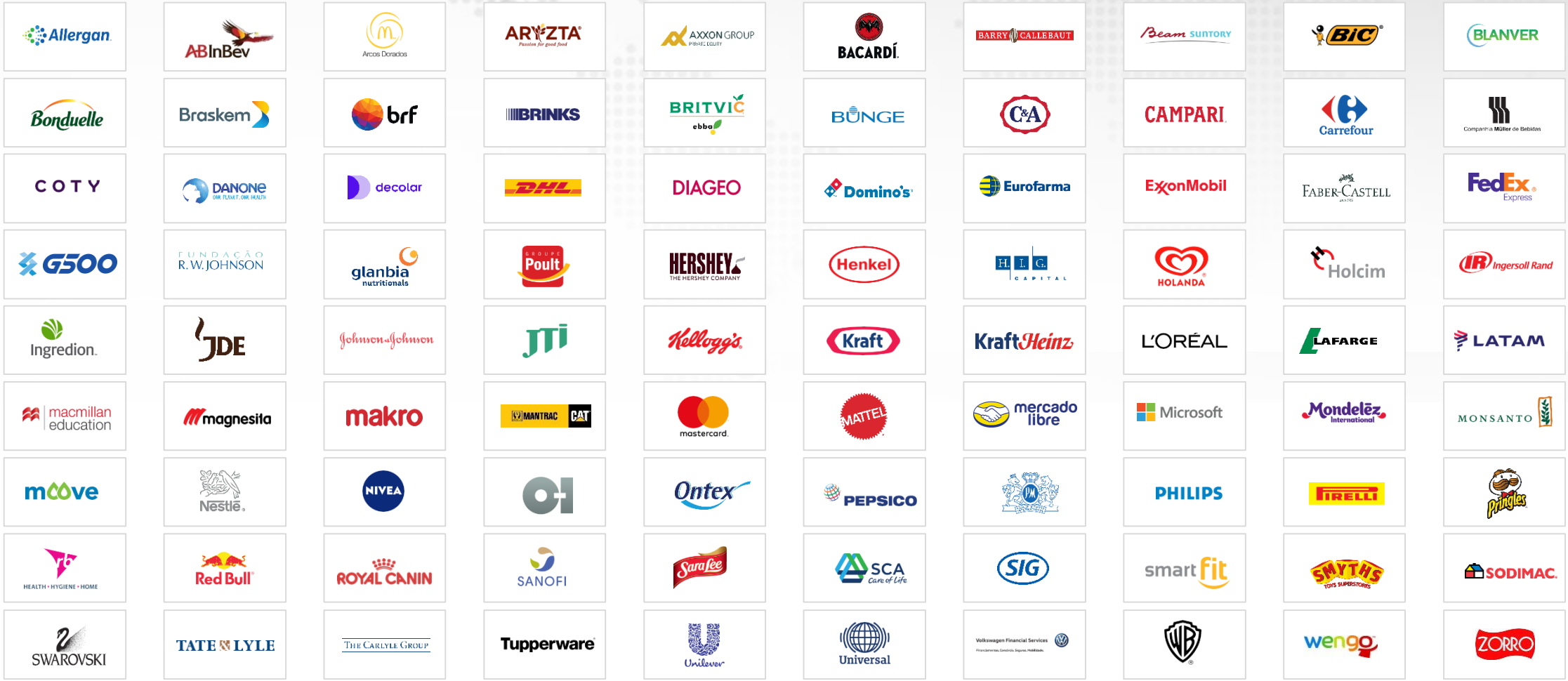
CLIENTS

projects **2662**

clients **822**

countries **75**

industries **47**



*Integration Consulting only features client logos that have been explicitly approved by written agreement. Current project numbers, clients, countries and industries are updated every semester.

INTEGRATION SOUTHERN CONE

After delivering several project throughout Argentina and Chile starting in 2003, we officially opened offices in Buenos Aires in 2006 and Santiago in 2008 to serve the region directly.

Together, the Argentina and Chile offices carry out projects in the **Southern Cone** (Argentina, Chile, Bolívia, Paraguay and Uruguay), as well as the **whole of the Andean region** (Colombia, Ecuador, Peru and Venezuela).

We have a solid team of local consultants that bring extensive knowledge of these realities and cultures to our client engagements.

Integration's Southern Cone operation is led by Director **Guido Solari,** with the support of Managers **Constanza Alves** and **Ezequiel Paez.**

+246 **PROJECTS**

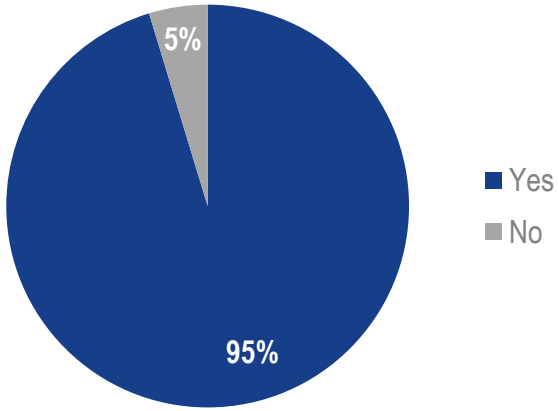
+131 **CLIENTS**

Appendix:

- About Integration Consulting
- **Companies' Survey: Detailed documentation**
- Students' Survey: Detailed documentation

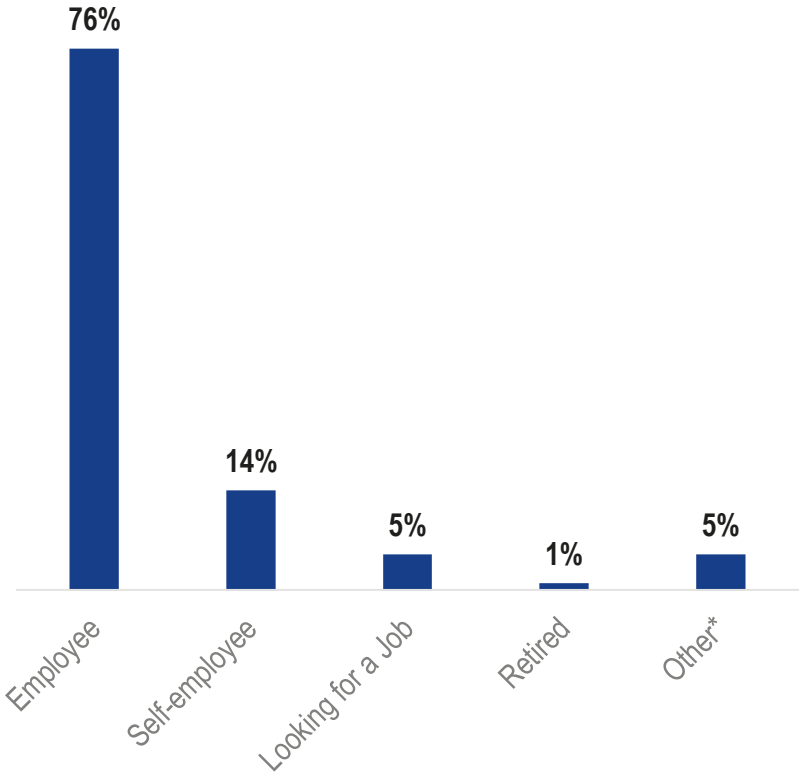
1 Are you an Engineering graduate from UC?

Base: 1170



2 What is your current employment status?

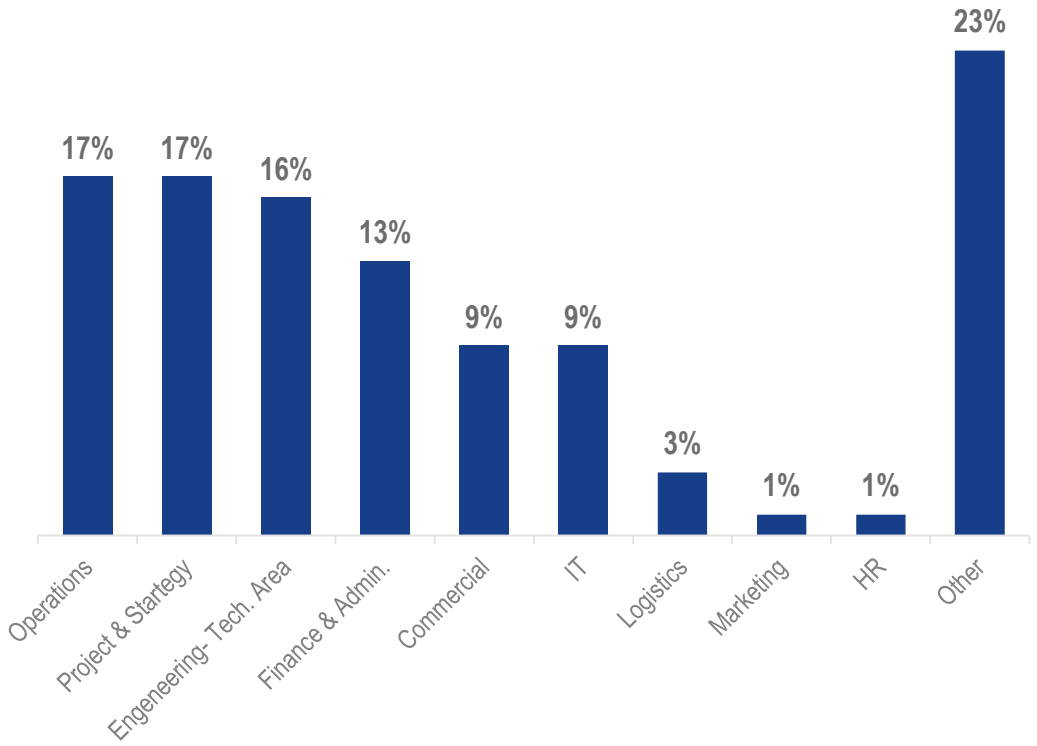
Base: 1170



Other*: MBA Student, PhD Student, Athlete

3 In which area do you work?

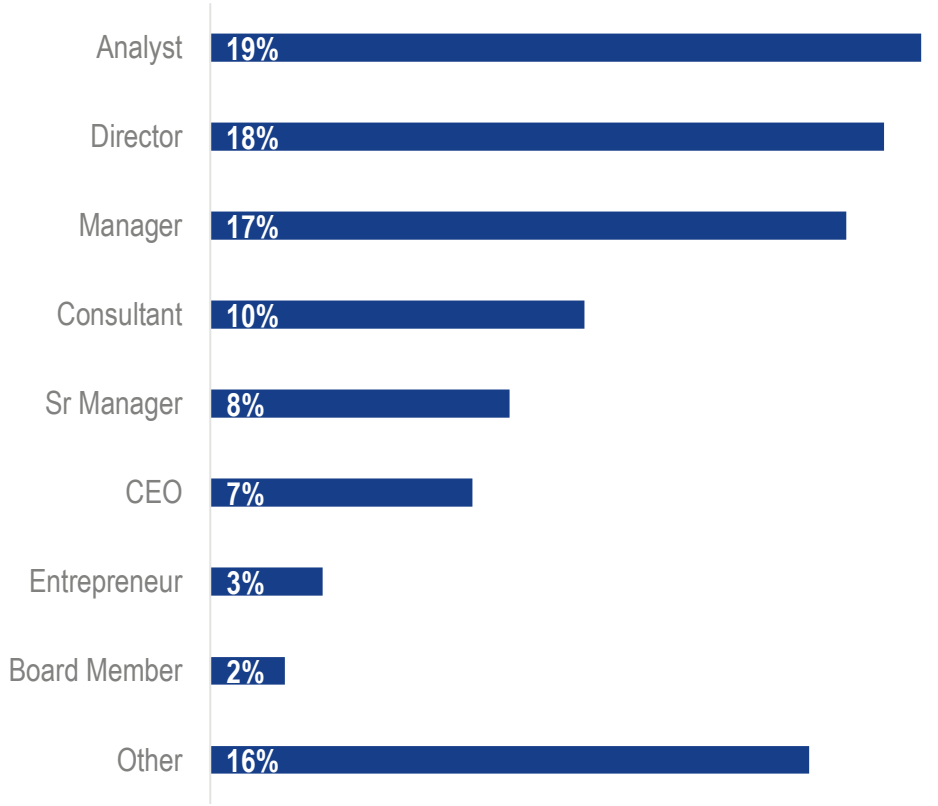
Base: 1170



Other*: Academic, Consulting, Board Member, CEO

4 What is your current job position?

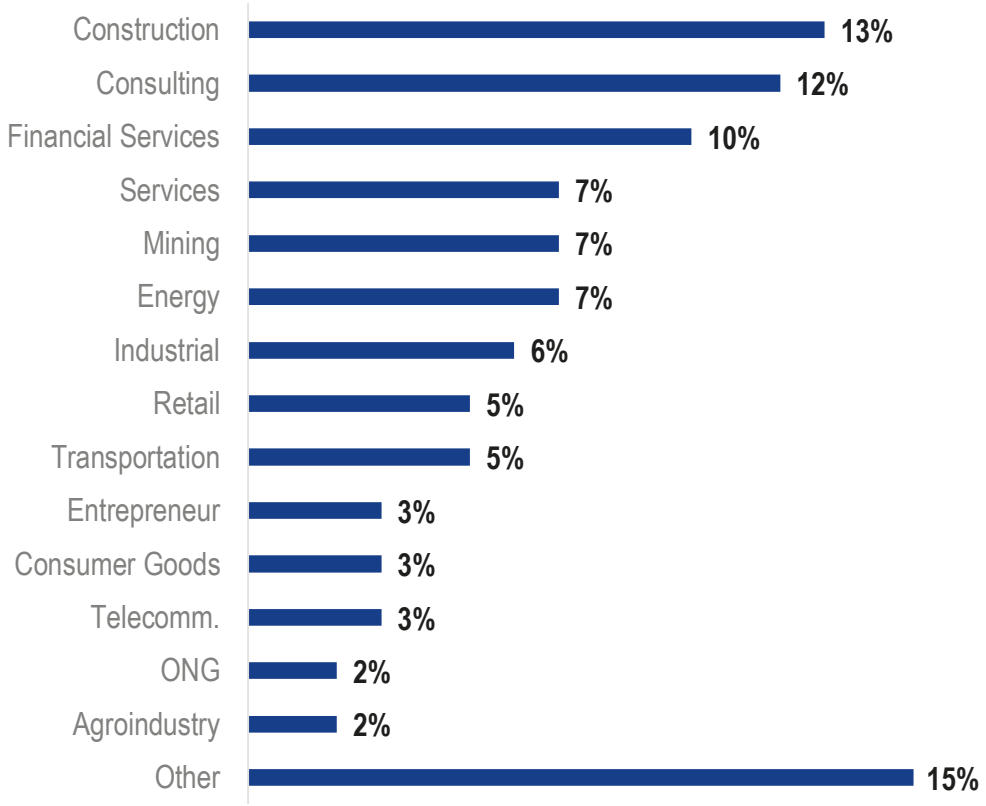
Base: 1170



Other*: Academic, Developer, Researcher

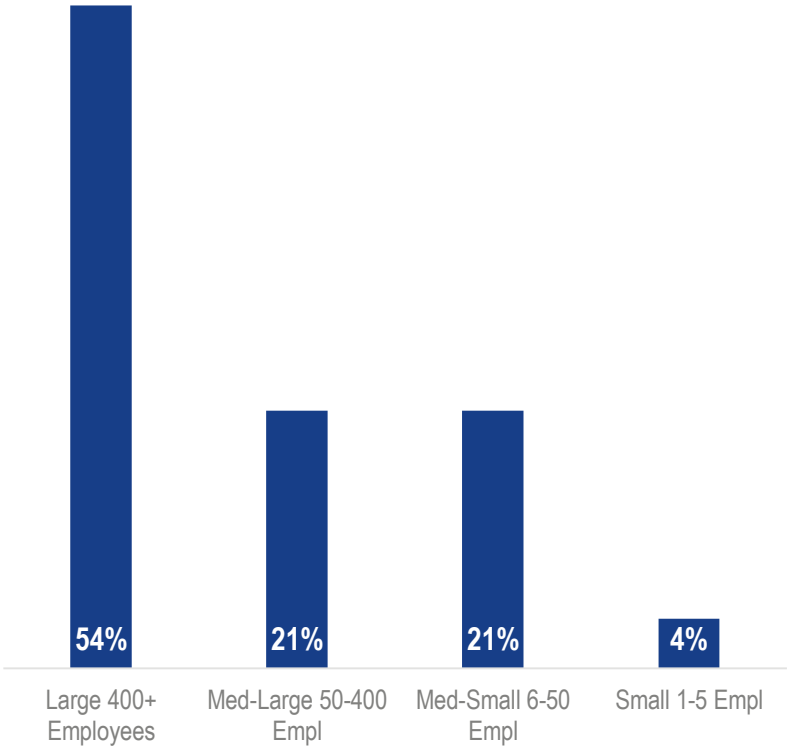
5 What industry does the company you work for belong to?

Base: 1100



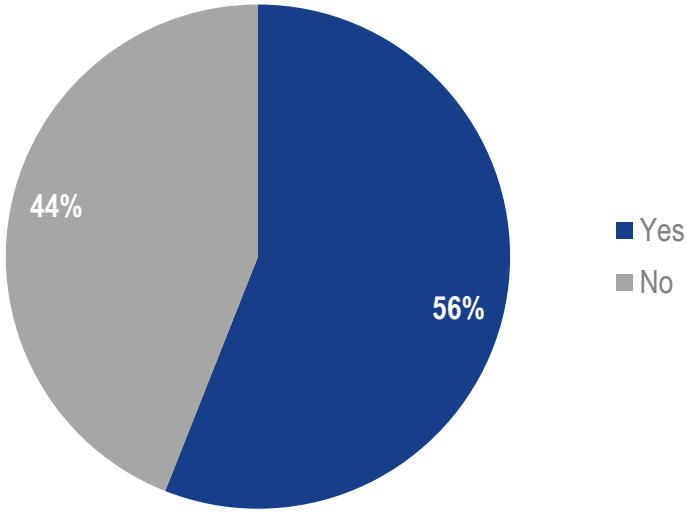
6 Size of the company you work/worked for

Base: 1106



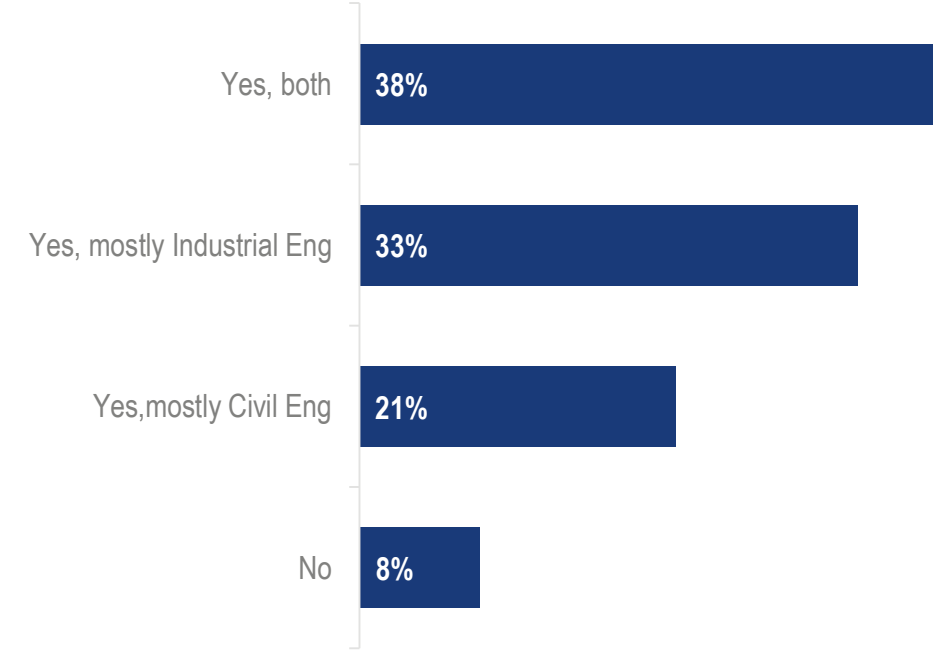
7 Has the company international presence?

Base: 1106



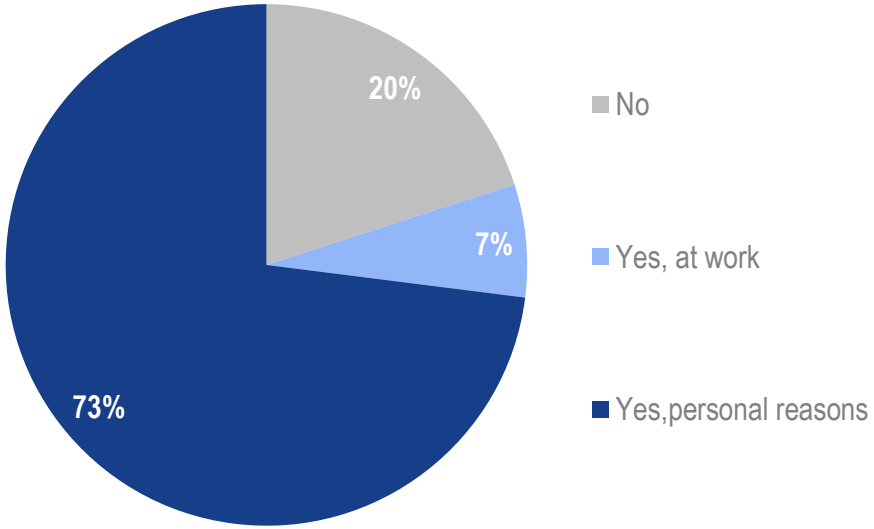
8 Does your company hire industrial or civil engineers?

Base: 1086



9 Do you know someone with a Bachelor in engineering sciences?

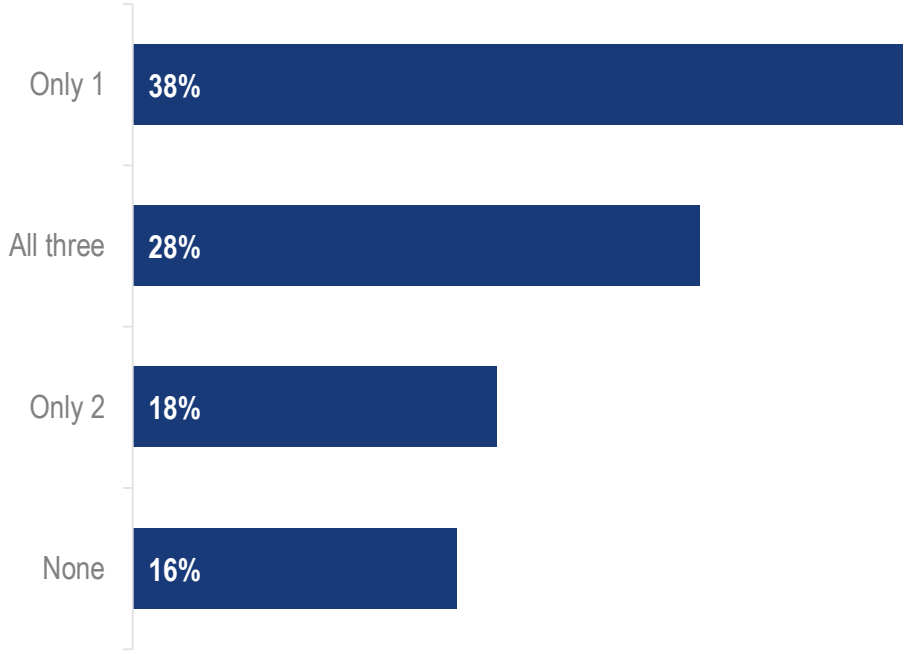
Base: 978



10 Which of the following elements do you know in relation to the Bachelor of Science in Engineering?

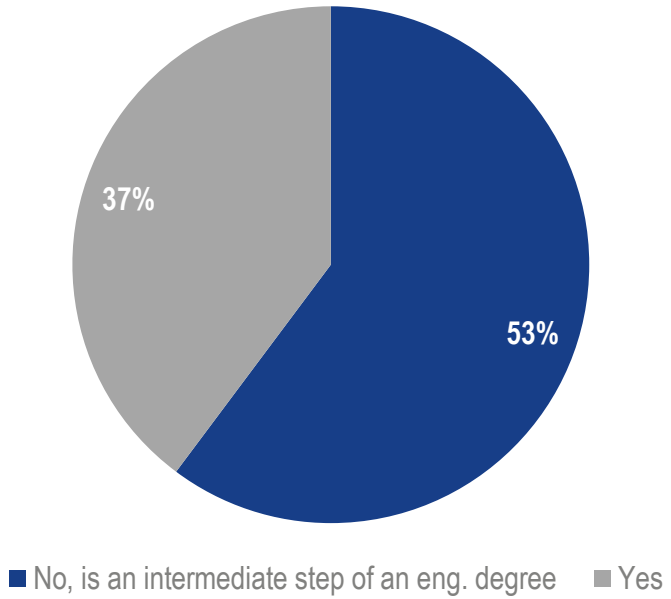
Base: 977

ELEMENT 1: DURATION *ELEMENT 2: COMPETENCES* *ELEMENT 3: CURRICULUM*



11 Do you think that a Bachelor in engineering sciences is a complete formation by itself?

Base: 910

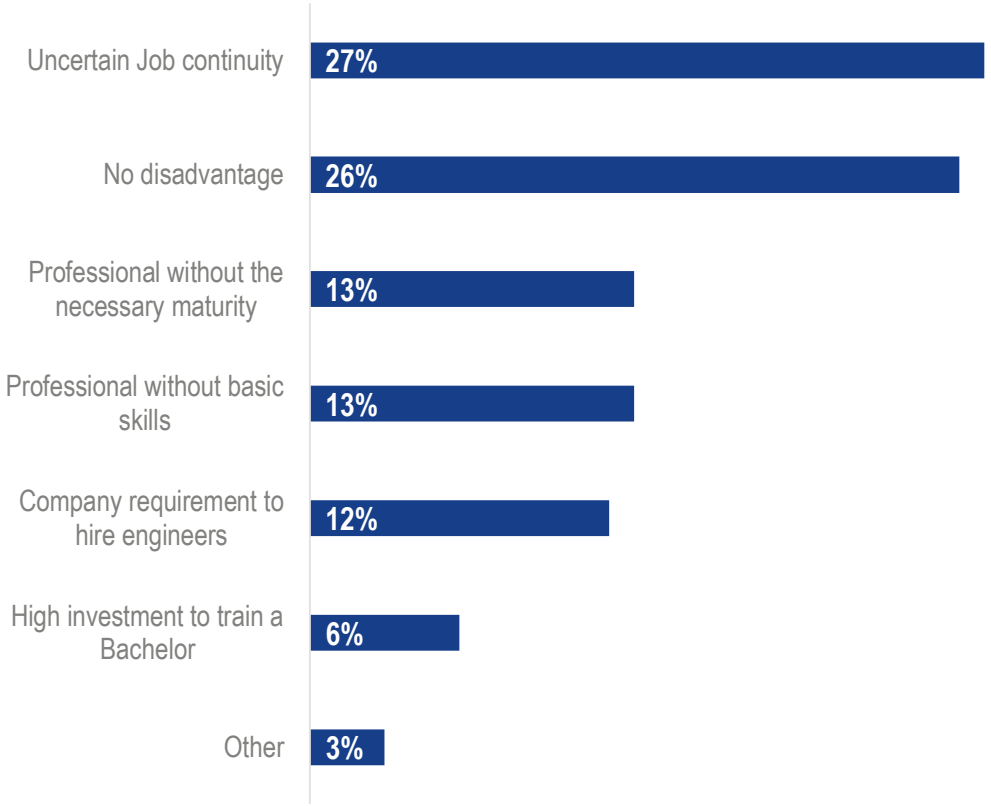


12 What do you think is the best benefit of hiring a candidate with a Bachelor of Science in Engineering?

Base: 851

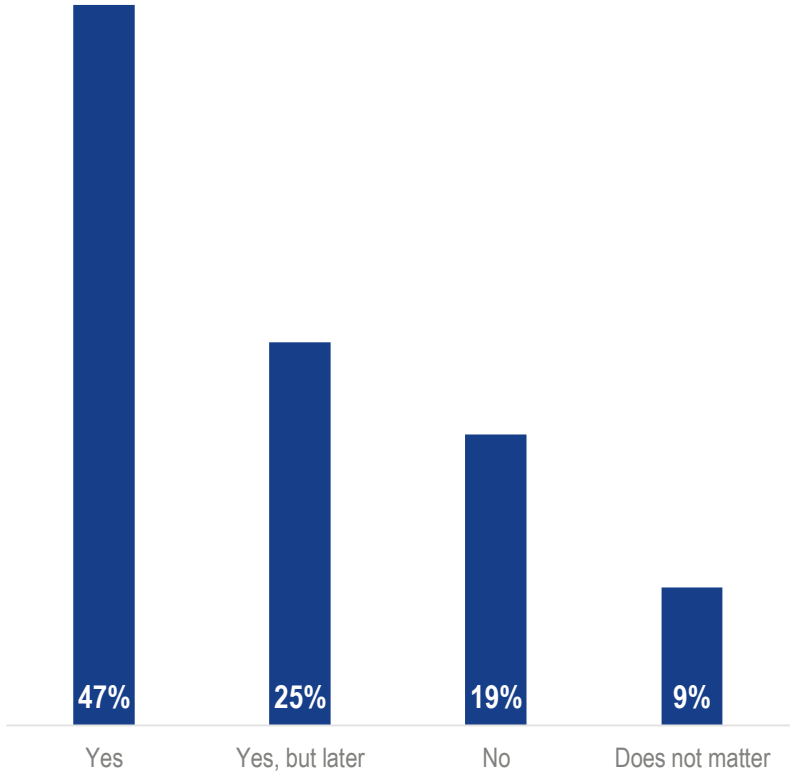
13 What do you think are the disadvantages of hiring a candidate with a Bachelor of Science in Engineering?

Base: 847



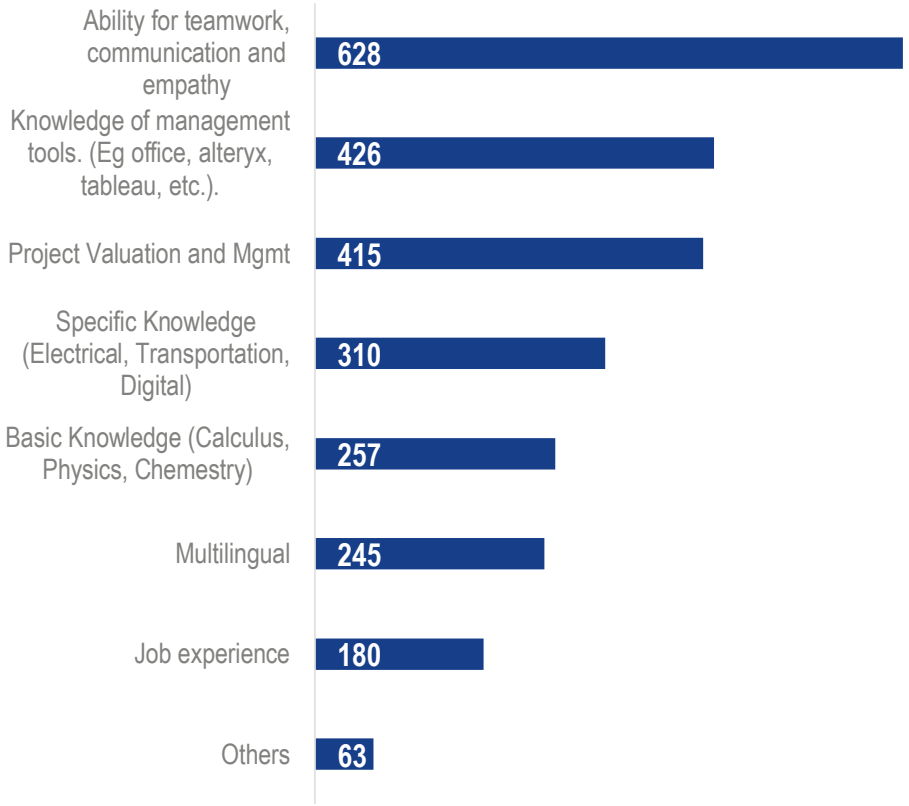
14 Would you consider hiring a Bachelor of Science in Engineering for an entry position in your company?

Base: 833



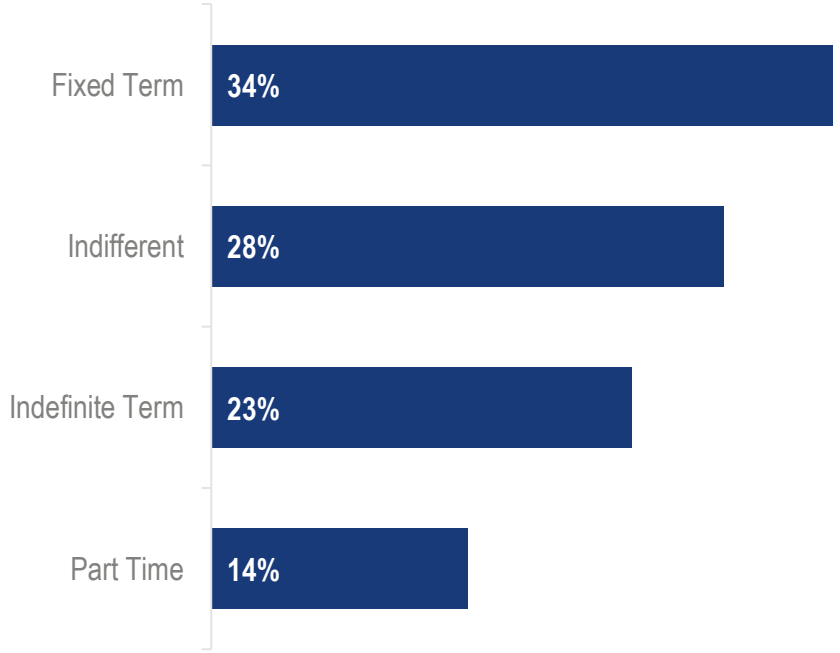
15 What are the most important knowledge/skills that the graduate should have to enter an entry position in your company?

Base: 805



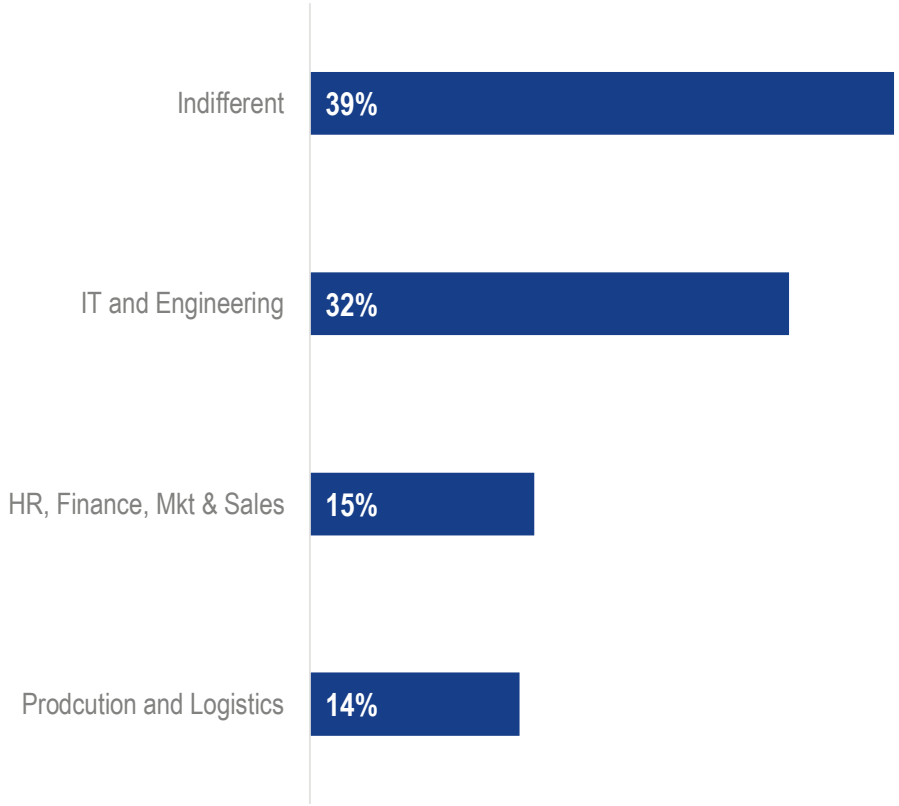
16 Type of contract

Base: 793



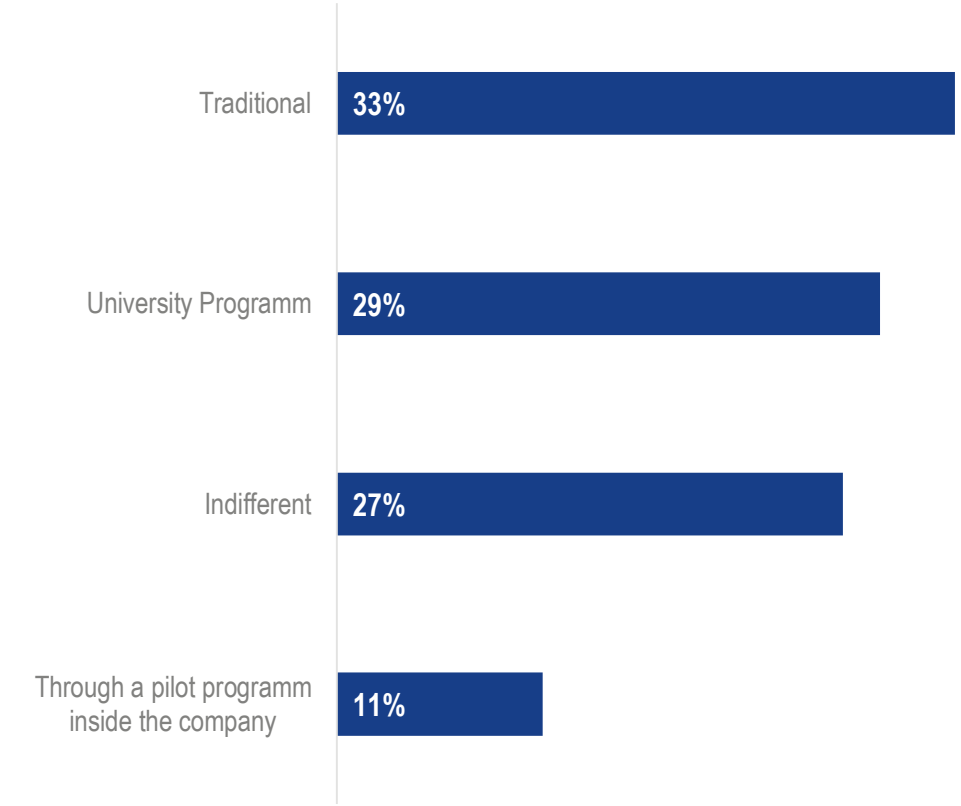
17 Which areas are best suitable for Bachelors in engineering sciences?

Base: 793



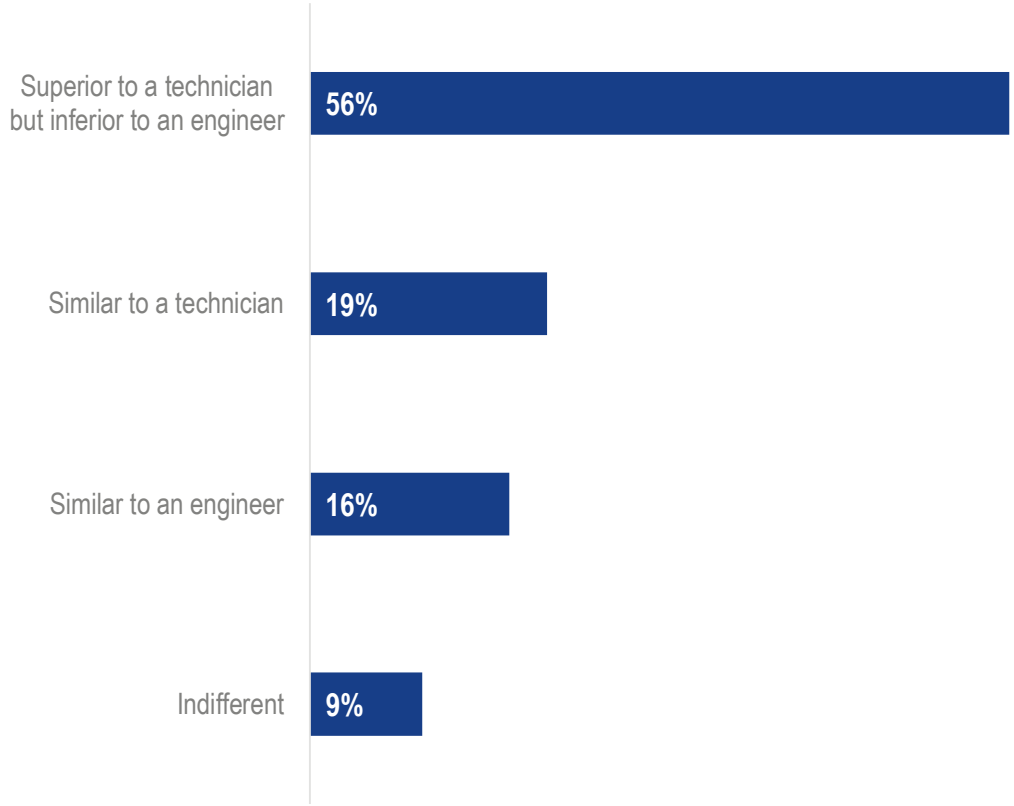
18 Hiring Process

Base: 793



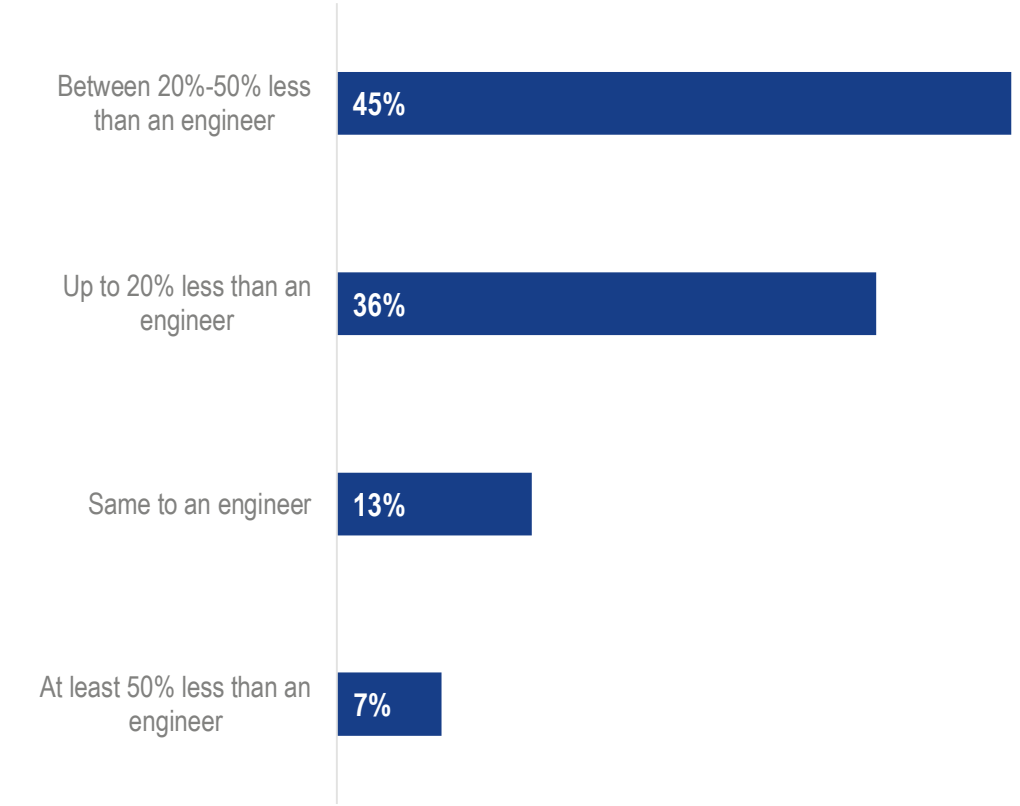
19 Position hierarchy

Base: 793



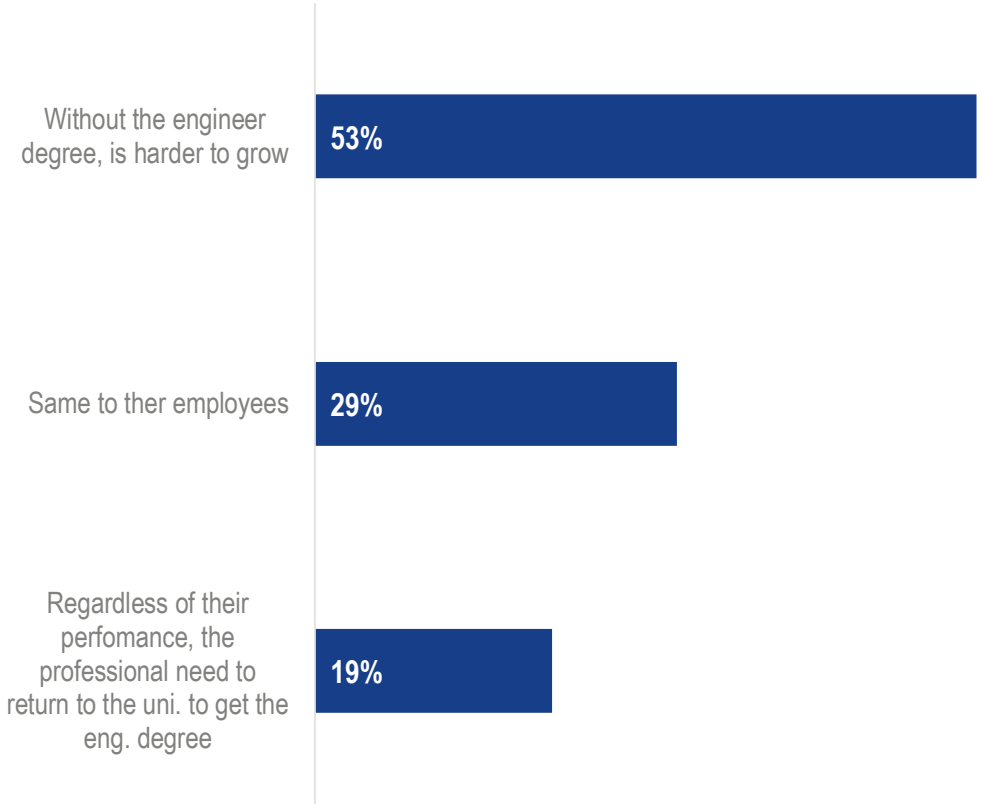
20 How the salary of a graduate should be compared to that of an engineer?

Base: 793



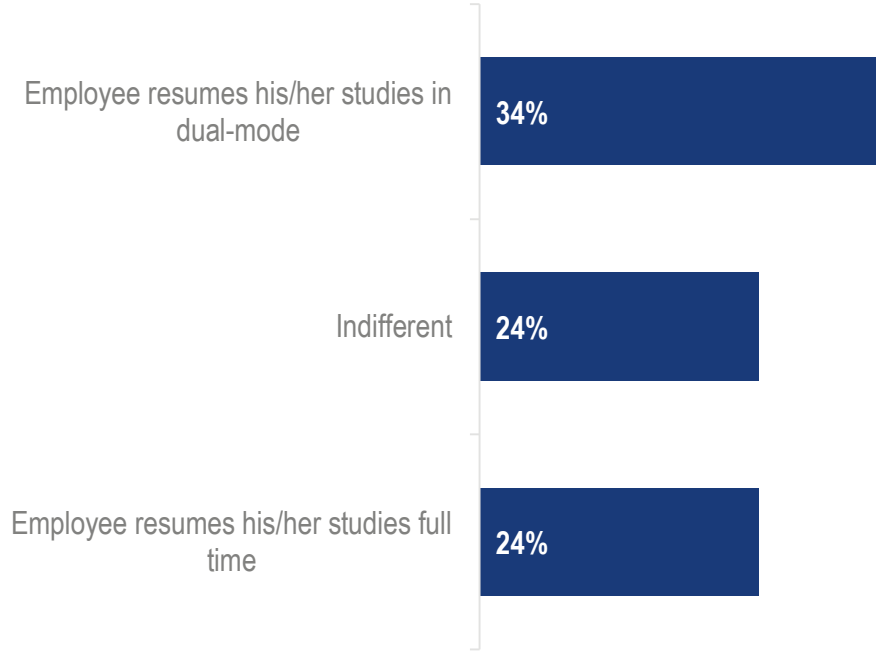
21 How do you think the professional development perspectives of this graduate are in your company?

Base: 793



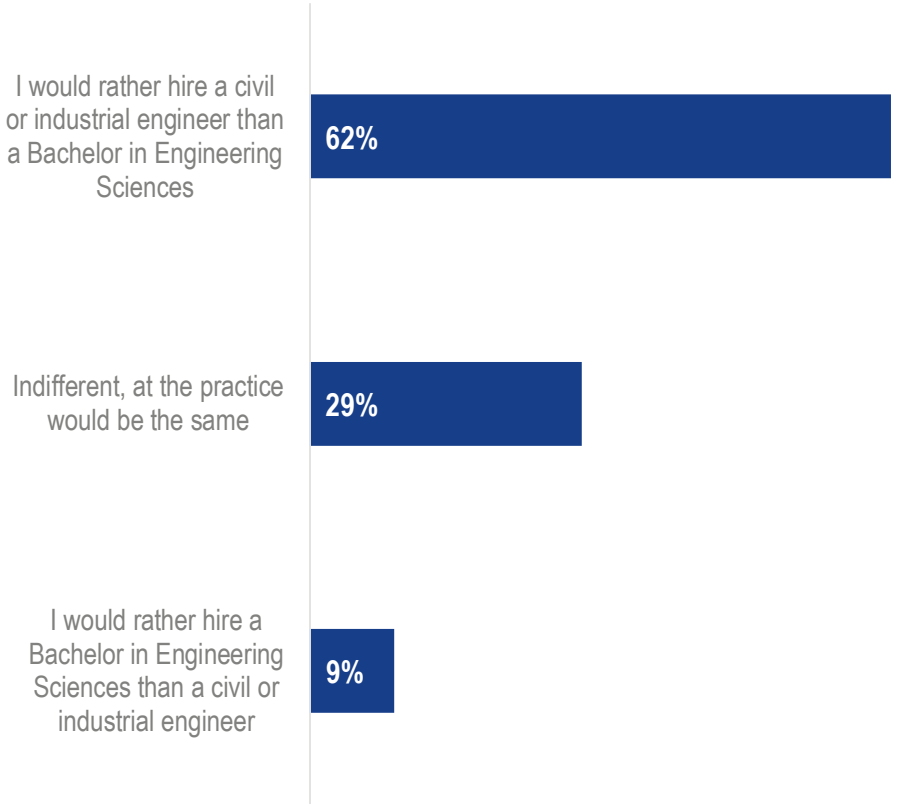
22 If the graduate wishes to re-obtain the engineering degree after some time (which would require approximately 1.5 years of additional study), what alternative would be more appropriate?

Base: 776



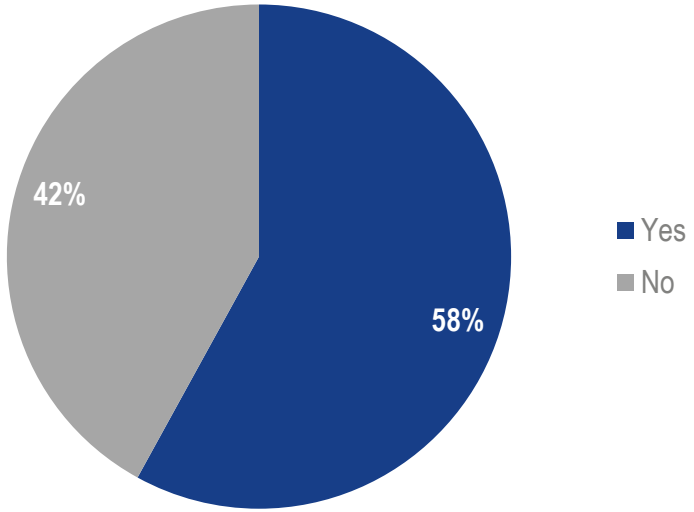
23 Thinking about the hiring needs of an entry position in your company, would you say that ...

Base: 768



24 Would the chances of hiring a graduate increase if the degree is internationally accredited as an academic degree in the US?

Base: 768

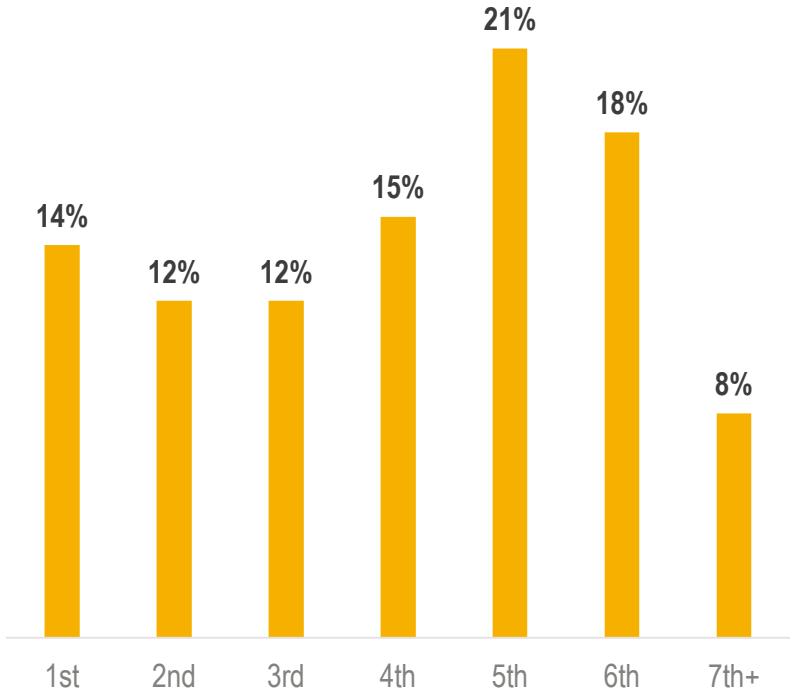


Appendix:

- About Integration Consulting
- Companies' Survey: Detailed documentation
- **Students' Survey: Detailed documentation**

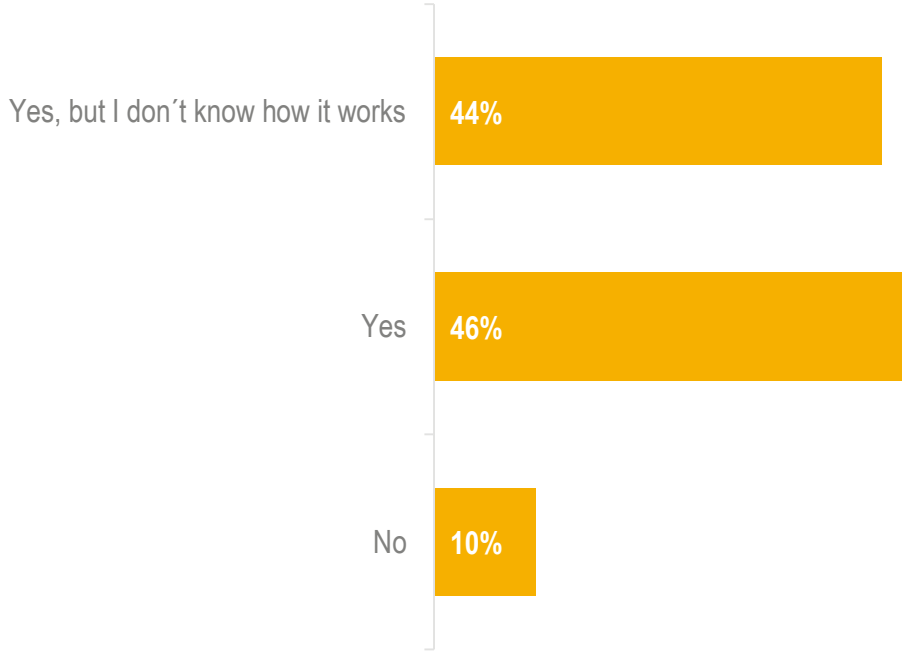
1 What year of study are you in?

Base: 842



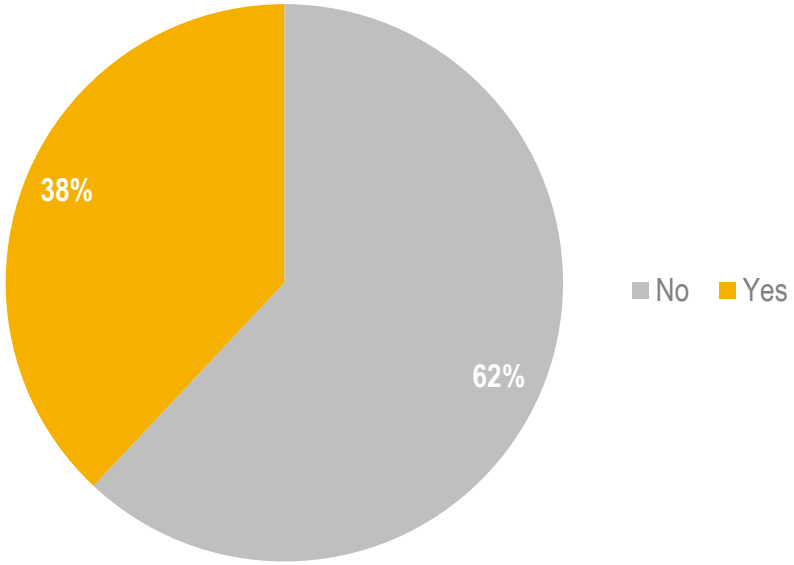
2 Did you know that there is the alternative of entering the labor market as a Bachelor of Engineering Sciences (at the end of the fourth year of the degree)?

Base: 818



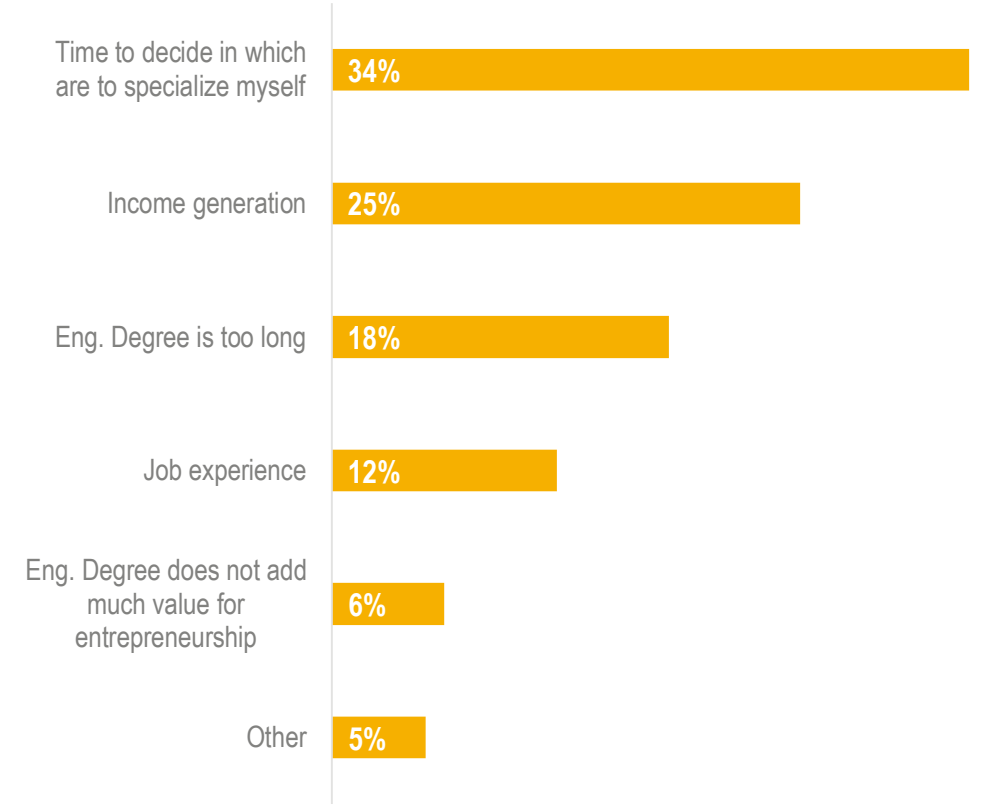
3 Is the idea of entering the job market as a Bachelor of Engineering Sciences attractive to you (with approx. 4 years of study)?

Base: 747



4 What is the main advantage that you see in the alternative of going out to the labor market as a graduate (4 years of study)?

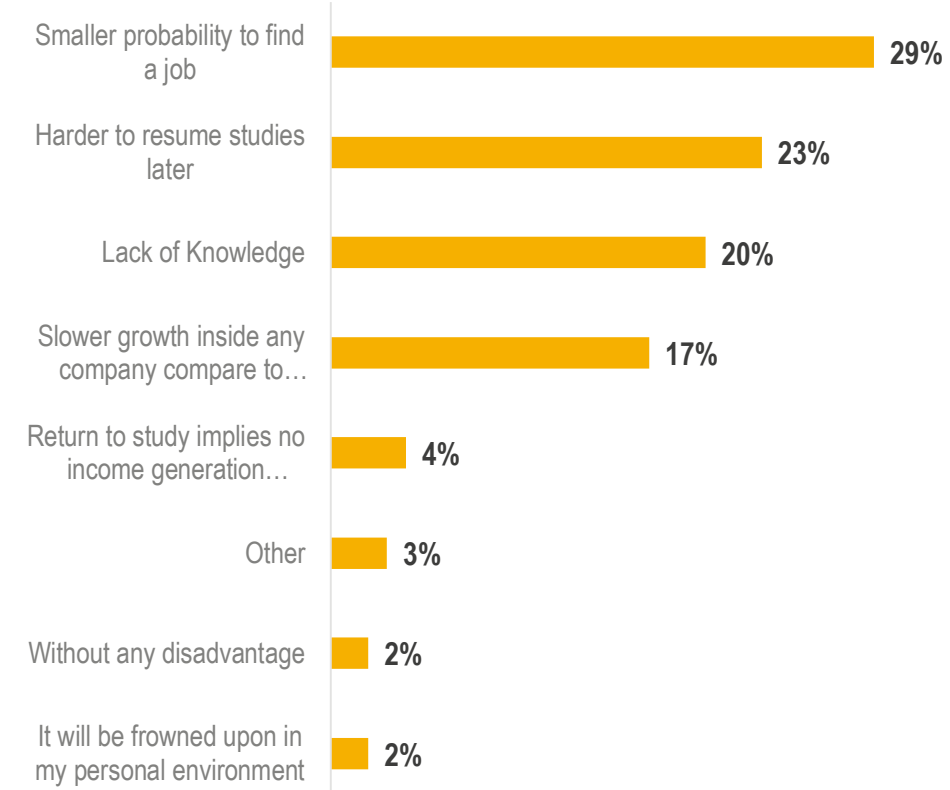
Base: 747



Other*: No advantage, Outside Chile the Bachelor Degree is irrelevant

5 What is the main disadvantage that you see in the alternative of going out to the labor market as a graduate ?

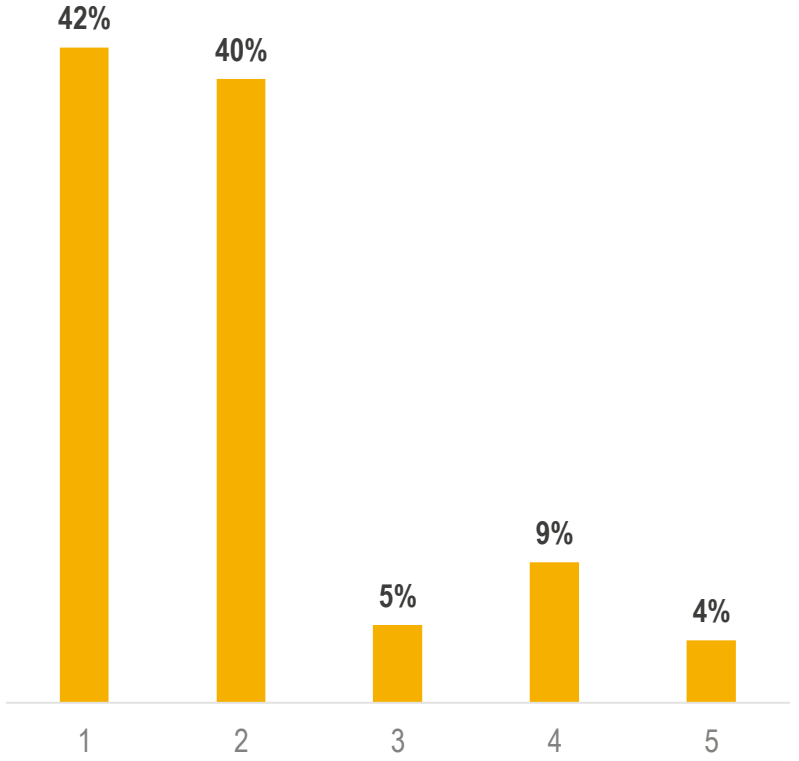
Base: 746



Other*: Scholarship forbids to interrupt studies, Lower income

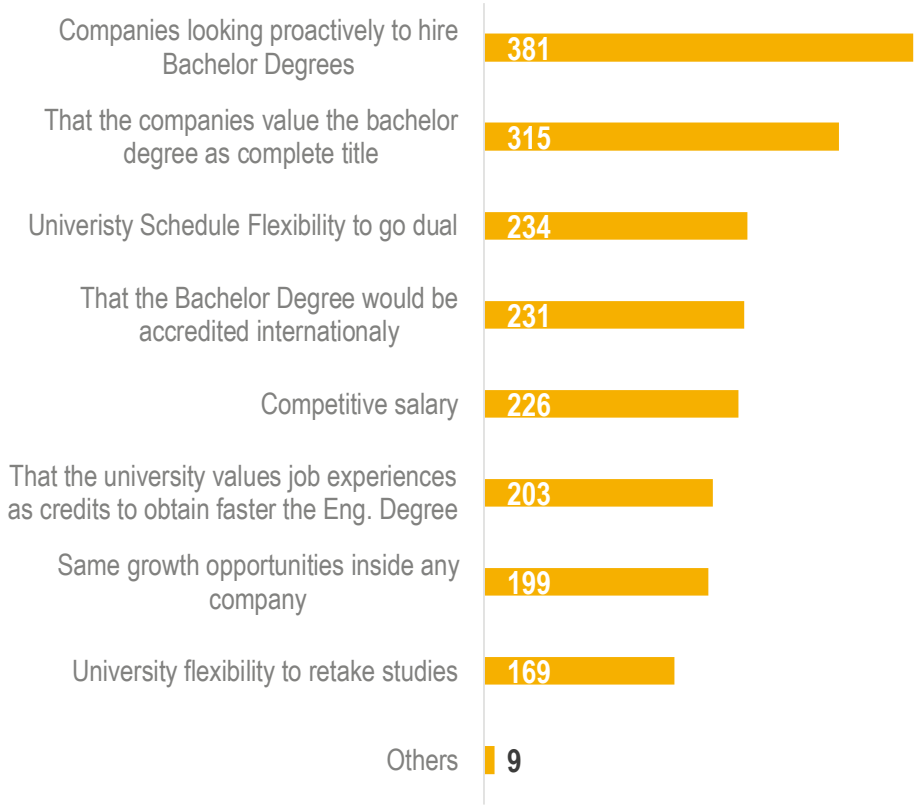
6 How likely is it that you will take the alternative of entering the job market as a Bachelor of Science in Engineering? (Scale 1-5, being 5 100% sure and 1 absolutely no)

Base: 717



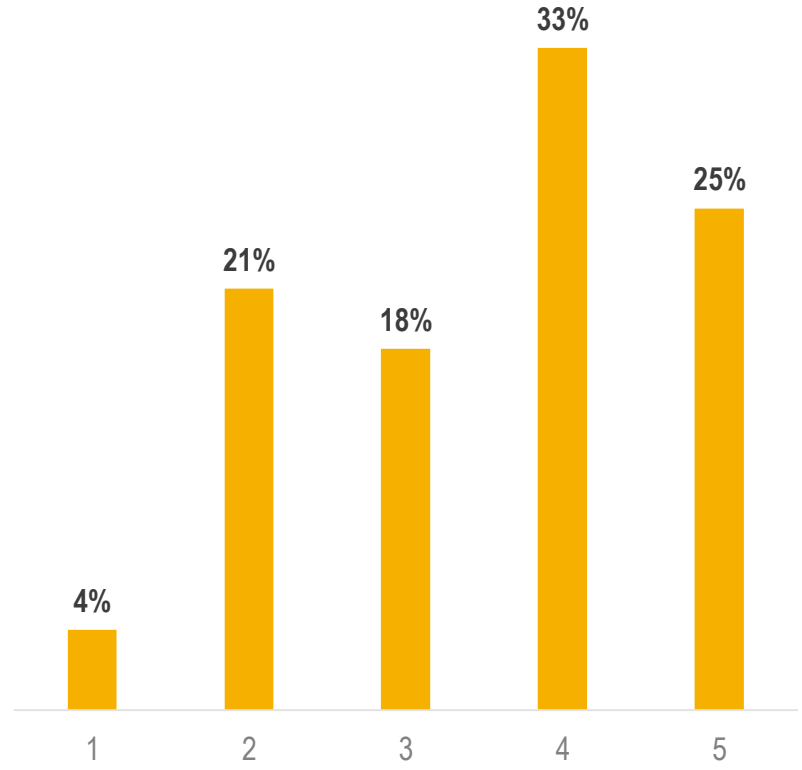
7 What factors would most increase your chances of choosing to go out to work with a bachelor's degree?

Base: 717



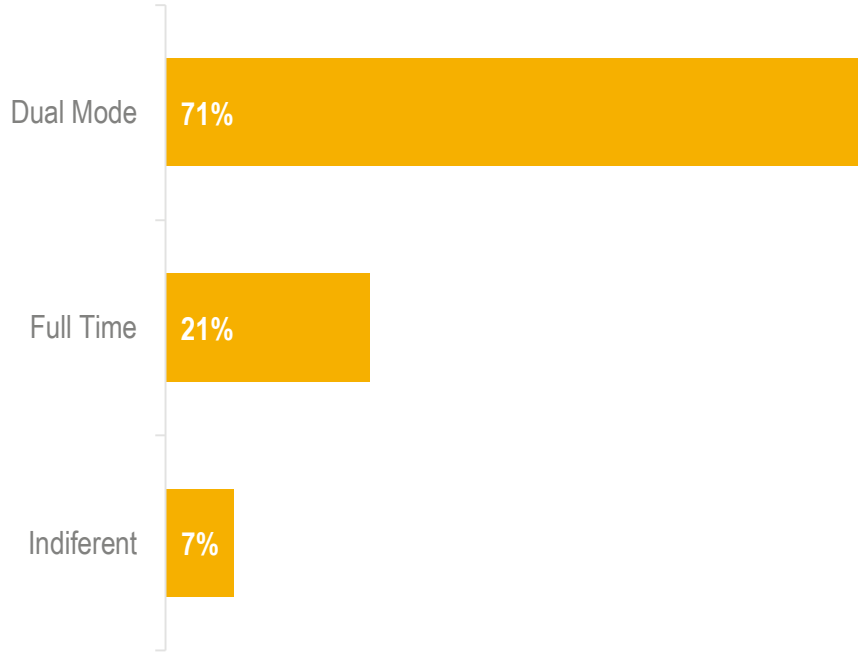
8 Suppose you decide to graduate (Bachelor) and start working. How likely it would be to return in the future (after 1 - 3 ys) to obtain an Engineering degree, assuming that you must study full-time for 1.5 years? Scale 1-5, being 1 I will not return and 5 I will definitely return

Base: 687



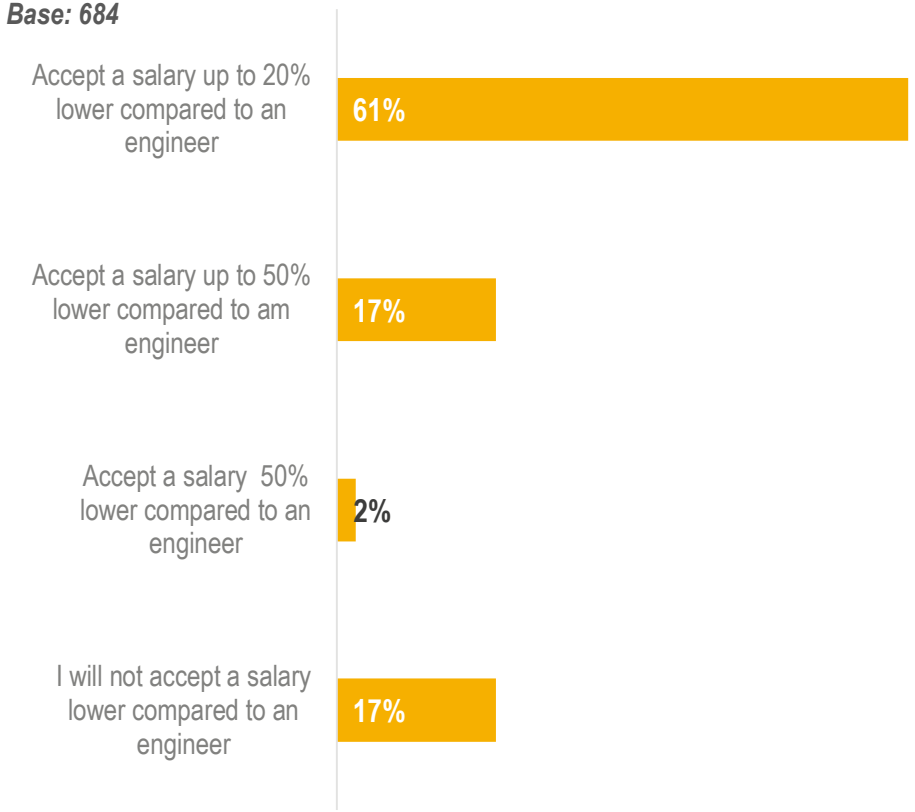
9 Suppose you decided to go out to work as a graduate, but now you want to go back to college to study. What modality do you think is the most convenient?

Base: 687



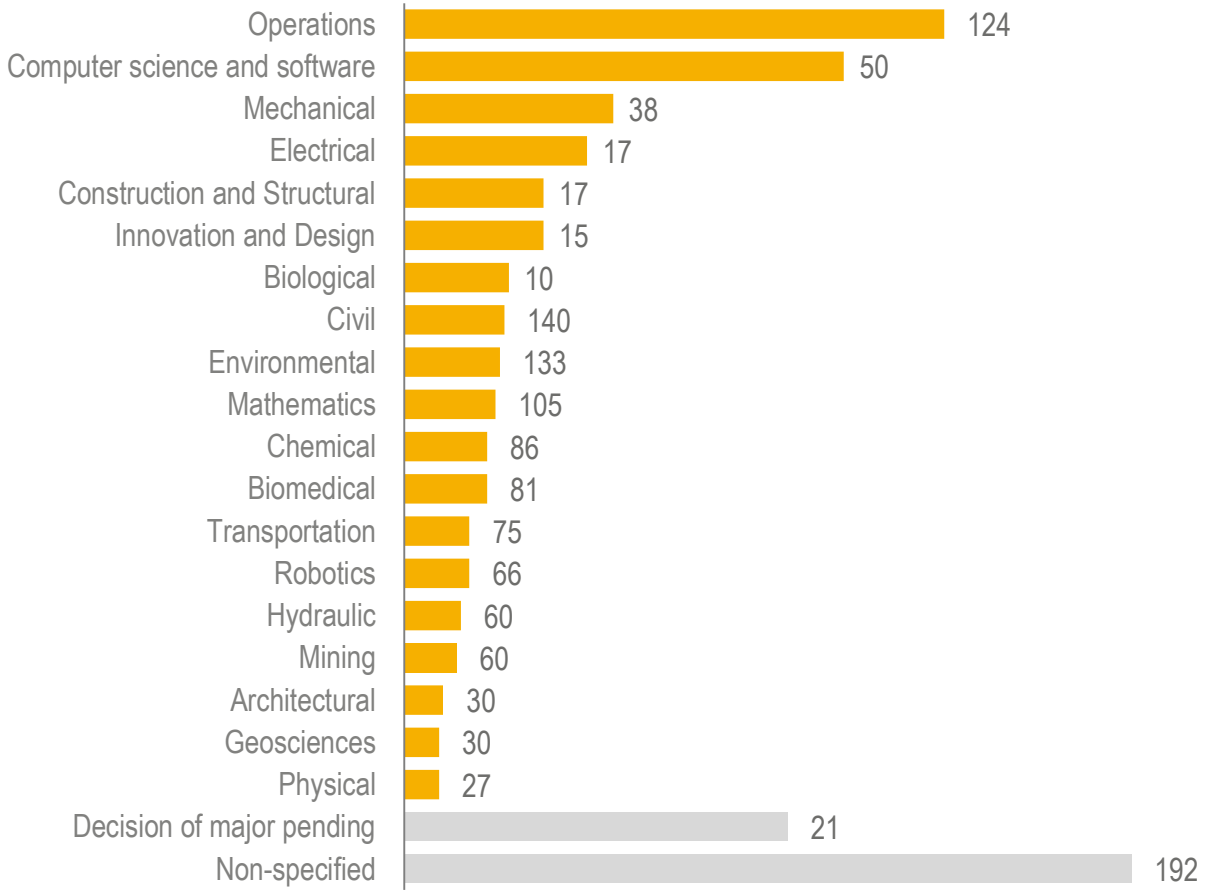
10 As long as you start working 1.5 years earlier, would you be willing to graduate as a bachelor and...

Base: 684



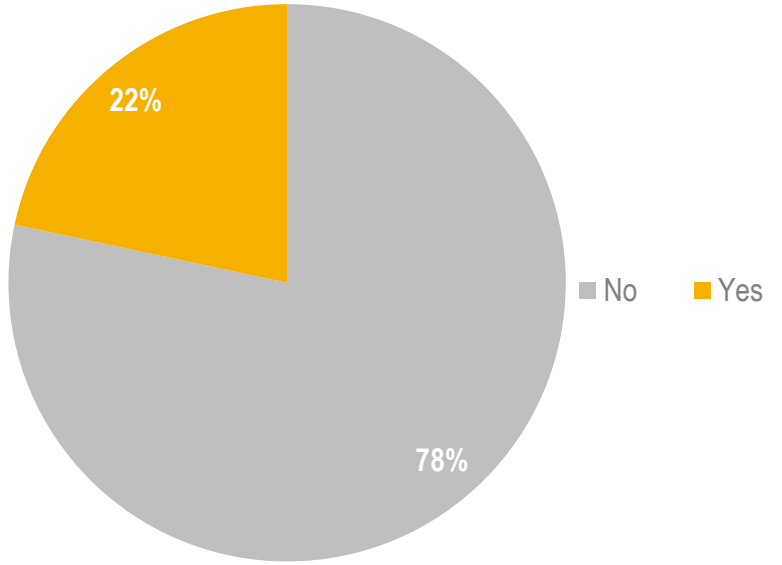
11 What major did you take or are currently taking?

Base: 842



12 Have you completed your Bachelor of Science in Engineering?

Base: 670



EMPLOYABILITY STUDY

BACHELOR OF SCIENCE IN ENGINEERING

ESCUELA DE INGENIERÍA
FACULTAD DE INGENIERÍA

Integration