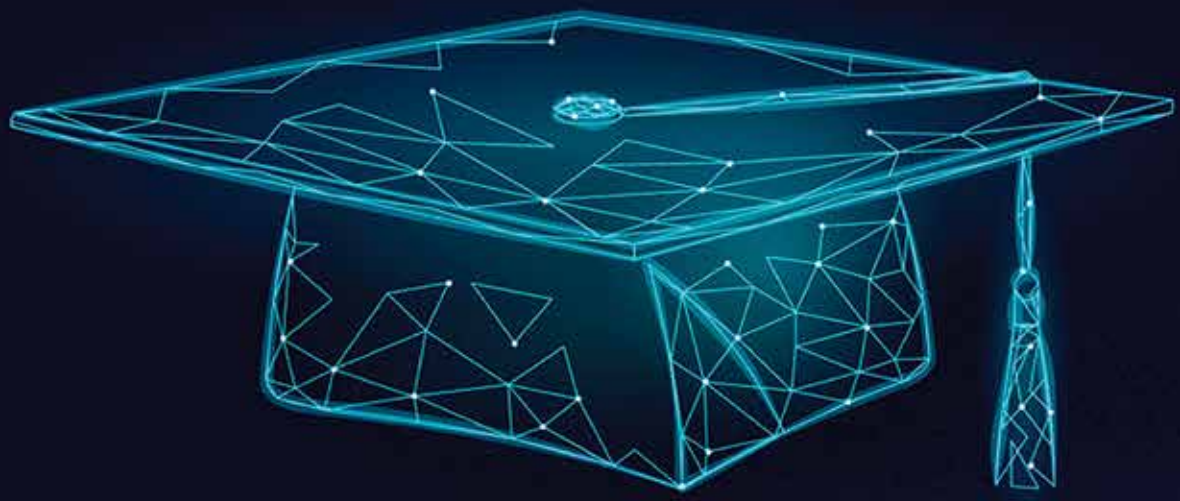
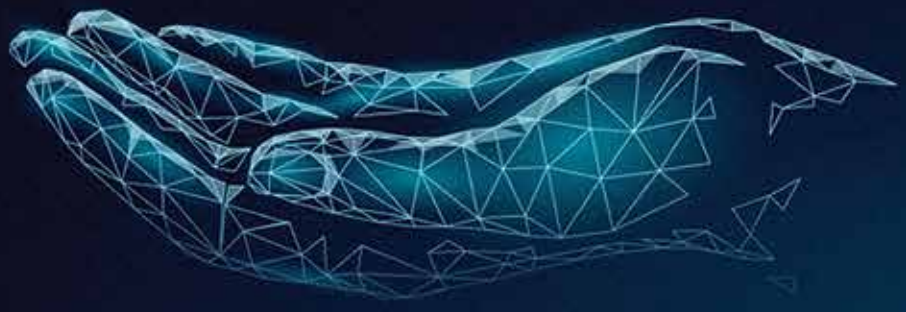
Arab Republic of Egypt

وزارة التعليم العالي والبحث العلمي

Ministry of Higher Education
& Scientific Research

EGYPTIAN HIGHER EDUCATION & SCIENTIFIC RESEARCH BLUEPRINT 2030





Arab Republic of Egypt

وزارة التعليم العالي والبحث العلمي

Ministry of Higher Education
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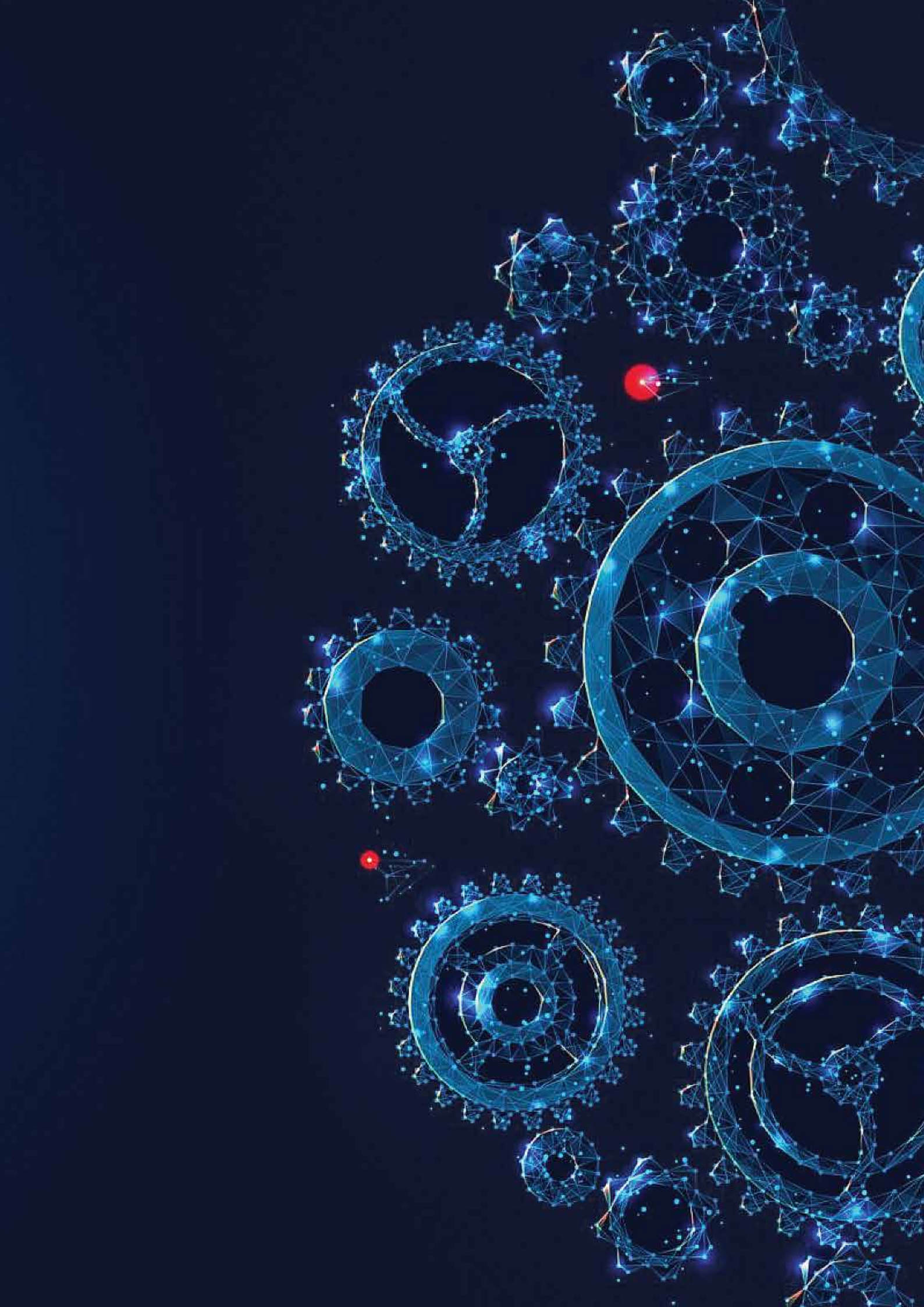
الإستراتيجية
الوطنية للتعليم العالي والبحث العلمي
٢٠٣٠



فهرس

كلمة فخامة السيد الرئيس/ عبدالفتاح السيسي

التعليم هو ركيزة التنمية الوطنية المستدامة، يشكل قوة دافعة للأمم للمضي قدمًا وإحداث تغييرات جذرية داخل المجتمع.

في هذا السياق، يظهر التعليم العالي كمكون رئيسي في المشهد التعليمي حيث يشكل الجبهة الأمامية للتطور الفكري والاجتماعي. عندما نتنقل الى تعقيدات العالم الحديث، يسعدني أن أقدم رؤية/ مخطط التعليم العالي المصري - خارطة طريق تعكس التزامنا بتمكين شبابنا، وتعزيز الابتكار، وتحديد موقع مصر كرائد عالمي في مجال التعليم والبحث.

هذه ليست مجرد خطة، بل خطوة لتسهيل الوصول إلى التعليم العالي ذي الجودة لجميع المصريين، بغض النظر عن خلفياتهم أو مواقعهم. من خلال الاستثمارات الاستراتيجية في المنح الدراسية والبنية التحتية والاتصال الرقمي، سنُطلق العنان لكل طالب ذوو طموح في وطننا العظيم.

التعاون بين الصناعة والحياة الأكاديمية هو نقطة رئيسية في هذه الخطة. نتصوّر ربطًا سلسًا بين قطاع التعليم والصناعة، حيث يتم تزويد خريجينا بالمهارات العملية وتعزيز روح ريادة الأعمال لديهم. سنبني معًا قوة عاملة تلبي متطلبات اقتصاد المعرفة.

لتحقيق هذه الرؤية التحولية، يعتد التعاون الجماعي بين الجامعات والهيئات التعليمية والطلاب وصانعي القرار والقطاع الخاص أمرًا أساسيًا. أدعو كل مصريً أن يدعم هذه المبادرة، لكي يتم صياغة نظام تعليمي يساعد علي التغيير والتطوير ليس فقط علي مستوي حياة الأفراد بل ايضاً علي مستوي النهوض بمصر نحو ازدهار لا مثيل له.

أعرب عن امتناني الصادق لكل من ساهم في هذه الخطة. تفانيكم وايمانكم بقوة التعليم لهما الأثر الكبير في تحقيق هذه الرؤية. بدعمكم المستمر، سنبني نظام تعليم عالي يلهم الأجيال ويؤمن مستقبلًا أفضل لمصرنا الحبيبة.

عبد الفتاح السيسي
رئيس جمهورية مصر العربية

كلمة دولة رئيس مجلس الوزراء أ.د/ مصطفى مدبولي

”يعتد النظام التعليمي العالي المصري كشهادة للتفاني الوطني في تحقيق التميز الأكاديمي والتقدم والابتكار. خلال العقد الماضي، شهدنا نموًا ملحوظًا وتقدمًا ملموسًا، حيث اتسمت هذه المرحلة بتوسيع نطاق الجامعات الوطنية والتكنولوجية، وإنشاء فروع لجامعات أجنبية عالمية، بالإضافة إلى التركيز المشترك على التكامل التكنولوجي.

شهدت عدة مبادرات تقدم نظام التعليم العالي لدينا على المستوى العالمي، محققاً الاعتماد في مجالات حيوية مثل النشر البحثي، التدويل، الابتكار، ريادة الأعمال والمرجعية الدولية. الإنجازات التي نقدمها هي شهادة على التفاني وروح الابتكار في المجتمع الأكاديمي المصري.

ومع ذلك، وفي غضون الإعتراف بإنجازات وزارة التعليم العالي والبحث العلمي، ندرك أهمية استمرار التطور ليس فقط لمواكبة الاتجاهات العالمية ولكن لتخطيها و النهوض بالمنظومة. رؤيتنا تتضمن إنشاء نظام تعليمي يترسخ بقوة في اقتصاد المعرفة وانتقال ثابت وسريع نحو التحول الرقمي. نعمل بنشاط على إدخال برامج محدثة دوليًا و متعددة الاختصاصات بسلاسة بين العلوم المتقدمة مثل الروبوتات، الذكاء الاصطناعي، الطب الجيني، وسائل النقل الذاتية، الاقتصاد الرقمي وتحقيق الأداء الآلي للعمل المعرفي.

أود أن أشكر الفريق الذي عمل وساهم في هذه المبادرة المستقبلية. دعونا نبدأ معًا في هذه الرحلة التحولية صياغة مستقبل يكون فيه التعليم العالي المصري قوة دافعة في الابتكار العالمي والتنمية الاقتصادية.“

مصطفى مدبولي
رئيس مجلس الوزراء لجمهورية مصر العربية

كلمة معالي السيد الوزير أ.د/ محمد أيمن عاشور

”تشكل هذه المبادئ أساس خارطة طريقنا. هذه الخارطة هي رؤيتنا المشتركة لإعادة تصوير مستقبل التعليم العالي والبحث العلمي في مصر، طامحين لتمييز وطننا كمركز عالمي لاقتصاد المعرفة المزدهر.

تحقيق هذه الخطة الطموحة يتطلب التزام الجميع - الجامعات وأعضاء هيئات التدريس والطلاب وصناع القرار والقطاع الخاص.

أحث كل مصري على اعتناق هذه الرؤية التحولية، فمعًا، لدينا القوة لتشكيل نظام تعليم يساعد علي التطوير والتغيير ليس فقط علي مستوي حياة الأفراد ولكن ايضاً يدفع مصر إلى مستويات جديدة من التنمية.

مع اختتام مرحلة التخطيط لهذه الاستراتيجية، يسعدني أن أشاركها مع قطاع التعليم العالي والبحث العلمي في مصر، بالإضافة إلى جميع السلطات والأفراد ذوي الاهتمام بتقدم التعليم العالي في جمهورية مصر العربية. أود أن أعرب عن امتناني لكل من شارك في صياغة هذه الاستراتيجية. أنا واثق أننا، معًا، سنحقق بنجاح الأهداف المحددة. أتمنى لجميع أصحاب المصلحة، بما في ذلك المؤسسات الأكاديمية والباحثين والطلاب كل التوفيق ودائماً نحو التقدم والنمو والازدهار المستمر لبلادنا الحبيبة.“

محمد أيمن عاشور
وزير التعليم العالي والبحث العلمي

دور التعليم العالي في الرعاية والتطوير

ساهمت منظومة التعليم العالي في اعداد العديد من الكوادر المصرية التي أحدثت طفرة في مجالات متعددة عالمياً.

أحمد زويل
الحاصل على جائزة نوبل
خريج جامعة الاسكندرية

علي مصطفى مشرفة
عالم الفيزياء المصري
خريج جامعة القاهرة

فاروق الباز
عالم الفلك البارز بوكالة ناسا
خريج جامعة عين شمس

السير/ مجدي يعقوب
جراح القلب العالمي
خريج جامعة القاهرة

مسارات منظومة التعليم العالي والبحث العلمي الحالية

تنقسم منظومة التعليم العالي الى ثلاث مسارات أساسية:

تاريخ التعليم العالي في جمهورية مصر العربية

بالنظر الى التاريخ نجد أن القدماء المصريين أول من وضع نظام للتعليم بشكل مشابه لوضعه الحالي واعداد الجدارات المطلوبة للوظائف المطلوبة في المجتمع. حيث أن منذ أيام القدماء المصريين كانت جامعة "أون" من أقدم الصروح التعليمية لإعداد الكتبة والمسئولين مروراً بالقرن السابع الميلادي وازدهار التعليم في الحضارة الإسلامية في شكل "الكتّاب" ومن بعدها انشاء مؤسسة الأزهر الموقرة حتى وصلنا الى مبدأ التبادل العلمي في عهد محمد علي في هيئة بعثات ثقافية لدول العالم.

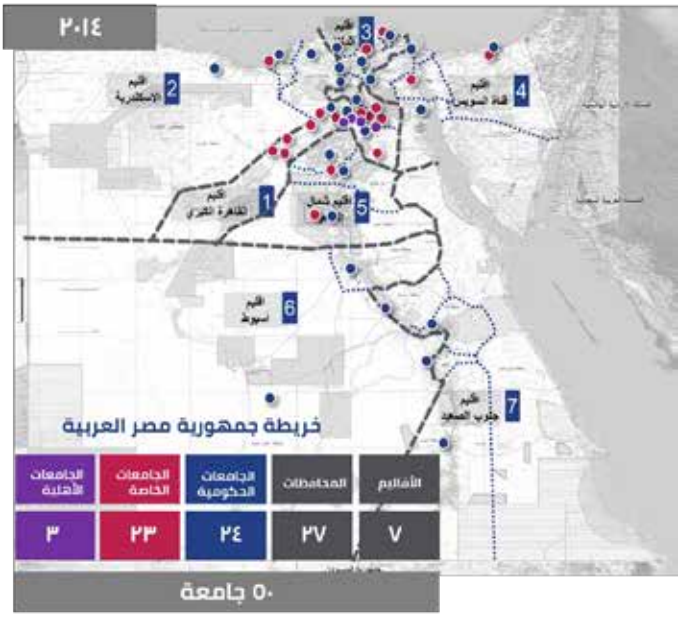
مؤسسات التعليم العالي المصرية

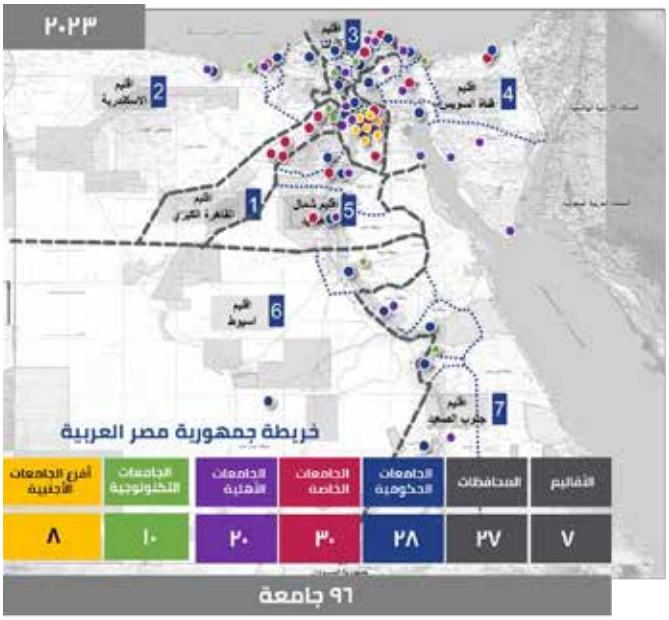
منذ أن أُنشئت بعام ١٩٦١, عنت الوزارة بوضع سياسات التعليم العالي والإشراف على تنفيذها وتطوير مؤسساتها حتى وصلت الى عدد ٩٦ جامعة وأكثر من ١٧٦ معهد عالي يرتادهم أكثر من ٣,٣ مليون طالب، بالإضافة عدد من المراكز الثقافية في دول العالم.

المسار الأول: بيئة نظام التعليم

أولاً: مبدأ الإتاحة:

منذ عام ٢٠١٤, بدأت مسارات التعليم العالي واتخاذ منهجية اتاحة مسارات جديدة غير الوضع الاعتيادي المنحصر في تعليم حكومي وخاص وحرصت الوزارة على تنشئة جدارات جديدة كما هو موضع في الرسم البياني الآتي:





ونجد أنه تم التوسع في انشاء صروح تعليمية وإتاحة فرصة التعلم لكافة المناطق بأقاليم جمهورية مصر العربية. وجدير بالذكر أنه تم استحداث المنظومات الآتية:

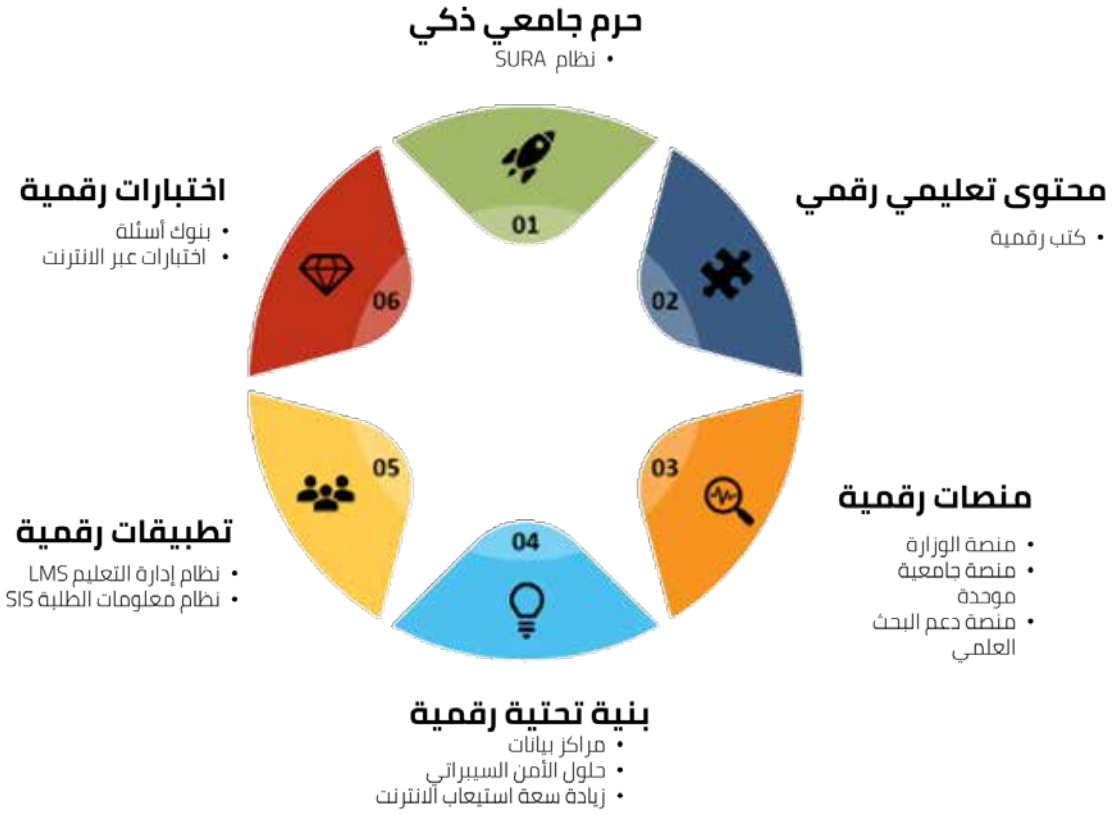
١. الجامعات الأهلية: لتحقيق مبدأ التكافل مع الجامعات الحكومية وإتاحة فرص التطوير والتوسع مع تخفيف العبء المادي عن كاهل الدولة.

٢. الجامعات التكنولوجية: كونها كيان مكمل للتعليم الفني ولإعداد كوادر مواكبة لمتطلبات الصناعة والتكنولوجيا المستقبلية.

٣. أفرع الجامعات الأجنبية: لتوفير تجربة التعليم العالمي محلياً وجلب الاستثمارات من الجامعات العالمية على الأراضي المصرية

ثانياً: التحول الرقمي:

تم تصميم وتنفيذ خطة للتحول الرقمي لإنشاء مركز رقمي متطور يضمن توصيل نظام التعليم العالي في مصر باستخدام أحدث التقنيات. يشمل ذلك الامتحانات الإلكترونية" عبر الإنترنت"، والأنظمة والتطبيقات، والبنية التحتية الرقمية، والحرم الجامعي الذكي، والمحتوى الرقمي، والمنصات الرقمية للعديد من الخدمات مثال منظومة "ادرس في مصر".



ثالثاً: الطلبة الدوليين:

زيادة عدد الطلاب الأجانب يأتي في مقدمة قائمة أولويات وزارة التعليم العالي والبحث العلمي، حيث الهدف هو تعزيز دور الدبلوماسية الثقافية وتشكيل وتمكين اقتصاد المعرفة في مصر. ونجد أن عدد الطلاب الدوليين في الجامعات المصرية زيادة، حيث ارتفع من ١٣,٥٣١ طالباً في عام ٢٠١٤ إلى ٢١,٠٨٤ طالباً في عام ٢٠٢٣. خصوصاً بعد إطلاق المبادرة الوطنية "ادرس في مصر".

رابعاً: الكلية وأعضاء هيئة التدريس:

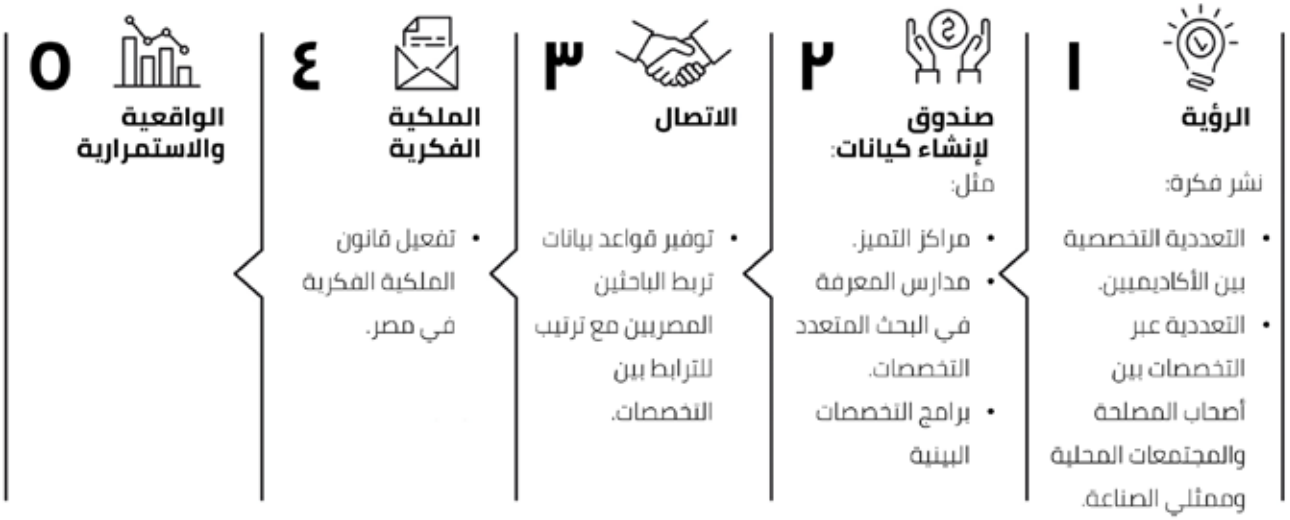
تعزيز القدرات يساهم في تجاوز الفجوة الرقمية في التعليم العالي من خلال شهادة موحدة للتحول الرقمي ودورات تدريبية. يُعد ذلك استعدادًا لأعضاء هيئة التدريس للتعامل مع المشكلات المحلية، وتشكيل فرق عمل متعددة التخصصات، والتكيف مع التغيرات في سوق العمل، ونرى في الرسم البياني الآتي خطة العمل لتحسين مؤهلات أعضاء هيئة التدريس في الجامعات المصرية:

التدريب	لاستهداف عدد من الباحثين بالجامعات الحكومية
التوسعة	علوم التخصصات البينية وإنشاء وتحديث القوانين لتوسيع البرامج ذات التخصصات البينية في الجامعات الحكومية والخاصة والأهلية
التميز الدولي	علوم التخصصات البينية والبرامج في البحث العلمي لتحقيق المنافسة في العمل التخصصات البينية، وخاصة في جودة الحياة والتنافسية في مؤشرات التنمية المستدامة، بما في ذلك في سوق العمل.

المسار الثاني: البحث العلمي والابتكار والأثر

أولاً: مؤشرات البحث العلمي:

تعزز الوزارة التعاون بين الباحثين والمؤسسات المختلفة لتعزيز اقتصاد المعرفة في مصر. تستوحي هذه النهج من إنشاء الولايات المتحدة هيئة البحث والتطوير الطبي الحيوي المتقدم (BARDA) في عام ٢٠٠٦، وتهدف إلى ربط الباحثين على مستوى البلاد. وقد وضعت الوزارة خمسة مبادئ لتسهيل البحث المتعدد التخصصات في مصر.



ثانياً: الهيئات الداعمة للبحث العلمي:

١. هيئة تمويل العلوم والتكنولوجيا والابتكار STDF
٢. أكاديمية البحث العلمي والتكنولوجيا
٣. صندوق رعاية المبتكرين والنوابغ

تم توفير تمويل من قبل تلك الهيئات للعديد من المشاريع الوطنية من خلال برامج مختلفة، بما في ذلك منح التطوير والابتكار، منح الدعوة المستهدفة الخاصة، ومنح بناء القدرات. ٢٠٢٢، تلقت عدة مشروعات دعمًا من هذه المبادرات التمويلية.

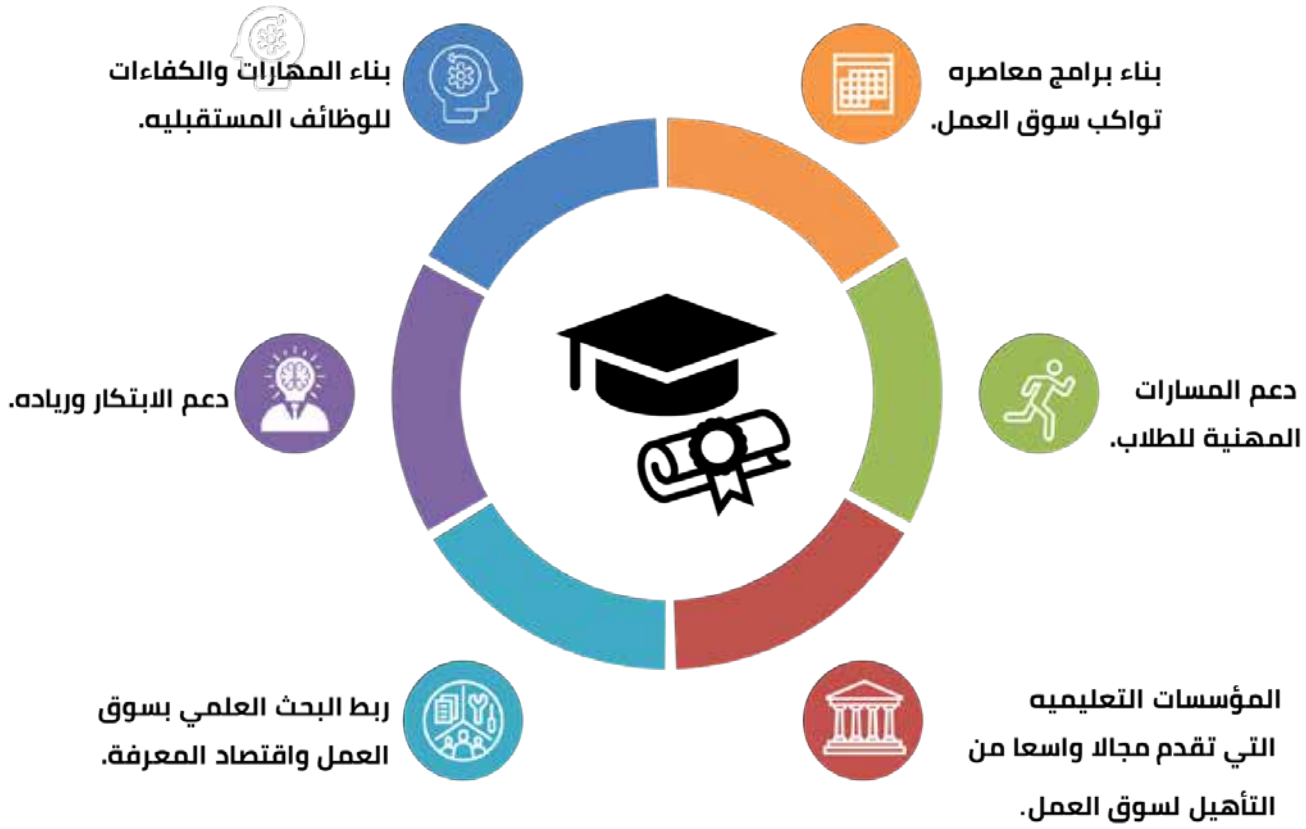
ثالثاً: الإدارة المركزية للبعثات:

ايماناً برؤية مصر ٢٠٣٠, تعمل الإدارة المركزية للبعثات كإدارة مركزية ضمن قطاع شؤون الثقافة والبعثات العلمية. تتكون الادارة من ادارتين رئيسيتين وظيفيًا:

١. **الإدارة العامة للبعثات:** تتولى الجوانب البرمجية، بما في ذلك استلام واختيار ومعالجة وثائق التقديم للمنح الدراسية والاشراف العلمي، كما تساعد في مراقبة التقدم الأكاديمي للمنحة وتعمل كواجهة بين المكاتب الثقافية والتعليمية المصرية والجامعات المصرية.
٢. **الإدارة العامة لرعاية المبعوثين:** تتولى وحدة الشؤون المالية مسؤولية ضمان صرف المصروفات المعتمدة المتعلقة بالمنح الدراسية في الوقت المناسب. ويشمل ذلك البدلات، ورسوم الدراسة، ورسوم المؤتمرات، ونفقات السفر، وغيره.

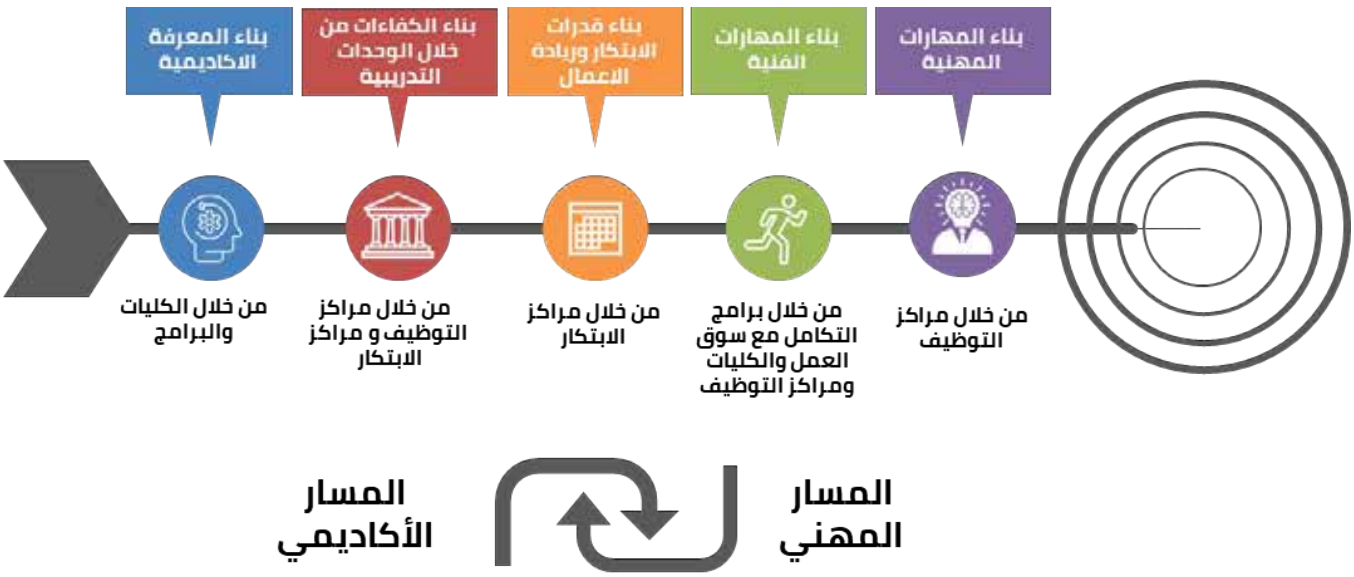
المسار الثالث: مسار الاتصال مع المجتمع

تلعب وزارة التعليم العالي والبحث العلمي دوراً حيوياً في تعزيز التطوير الوظيفي عن طريق تزويد الطلاب بالمهارات اللازمة لتنمية سوق العمل المحلي والدولي لتحقيق هذا الهدف ترتكز الوزارة على ٦ ركائز رئيسية وهي:



أولا: المفاهيم الرئيسية:

واستناداً الى الركائز المذكورة أعلاه قدمت وزارة التعليم العالي والبحث العلمي خمسة مفاهيم مبتكرة لدمجها في مسيرة الطلاب التعليمية لتجهيزهم بالمهارات التي تلبي احتياجات سوق العمل وتشمل الآتي:



ثانياً: بناء المهارات المهنية:

يتم العمل على تعزيز المهارات المهنية للخريجين من خلال دمج صناديق الدعم الوظيفي وإنشاء مراكز التوظيف داخل الجامعات وتهدف هذه المبادرات إلى دمج فرص التطوير الوظيفي العملي في العملية التعليمية وذلك من خلال:

١. صندوق الدعم الوظيفي: والذي يوفر موارد قيمة لربط المسارات الأكاديمية بالمسارات المهنية وتلبية احتياجات سوق العمل.
٢. مراكز التأهيل الوظيفي التي تم إنشاؤها في جميع الجامعات والتي تركز على إنشاء مسار مهني يتماشى مع سوق العمل ومرتبط بالرحلة الأكاديمية وتهدف هذه المراكز إلى دعم وتمكين الطلاب في الحصول على فرص عمل متميزة وتنافسية.
٣. دراسة التحديات التي تواجه التأهيل الوظيفي للطلاب وربط الدراسة الأكاديمية بسوق العمل.
٤. الحصول على منح لإنشاء مراكز جامعية للتطوير المهني مثل منحه الوكالة الامريكية للتنمية الدولية لإنشاء مراكز التطوير المهني بالجامعات.
٥. قيام مراكز التطوير المهني بتدريب عشرات الآلاف من الطلاب على العديد من المهارات اللازمة لسوق العمل.
٦. دور صندوق دعم التوظيف في معالجة التحديات التي تواجه مراكز التوظيف في الجامعات وسد الفجوة بين هذه المراكز وسوق العمل.
٧. وضع الوزارة للعديد من استراتيجيات التطوير المهني وتوظيف خريجي المستقبل من خلال ربط المسار التعليمي بسوق العمل من خلال مراكز التوظيف.
٨. دراسة الأدوات التكنولوجية التي تخدم تطوير التوظيف.

ثالثاً: قطاع المستشفيات الجامعية:

- تهدف المستشفى الجامعي إلى تقديم رعاية صحية رقمية ورعاية طبية متوافقة مع رؤية مصر ٢٠٣٠ بالإضافة إلى التوافق مع أحدث الأساليب الطبية والخدمية محليًا وعالميًا. وقد زاد عددها من ٨٨ إلى ١٢٥ ، مما يضمن توافر واستدامة التعليم الطبي وخدمات الرعاية الصحية عالية الجودة.
- تلعب المستشفيات الجامعية دوراً هاماً في قطاع الرعاية الصحية، وتسعى الوزارة بالتعاون مع مستشفيات المجلس الأعلى للجامعات إلى استكمال ١٦٠ مشروعًا لتجديد وتحديث المستشفيات الجامعية. حاليًا، تضم المستشفيات الجامعية ٣٠٪ من إجمالي أسرة الرعاية الصحية المتاحة المملوكة لمنشآت الرعاية الصحية الحكومية، وتخدم حوالي ٢٠ مليون مريض سنويًا وتدير ٣,٥ مليون حالة طوارئ سنويًا.
- شاركت المستشفيات الجامعية في تنفيذ المبادرة الرئاسية للتطبيب عن بعد لتشخيص عدد كبير من الحالات المرضية باستخدام الحلول التكنولوجية في العلاج.
- شاركت المستشفيات الجامعية في دعم المبادرة الرئاسية لدعم صحة المرأة، مع إعطاء الأولوية للفحص الدوري والعلاج الفعال لحالات سرطان الثدي المشخصة في جميع المستشفيات التابعة ومراكز السرطان.
- شاركت المستشفيات الجامعية في المبادرة الرئاسية لإنهاء قوائم الانتظار للعمليات الحرجة والتدخلات الجراحية العاجلة.
- تم اتخاذ العديد من المبادرات لتعزيز قطاع التعليم الطبي، على سبيل المثال، التحول إلى نظام الساعات المعتمدة وإنشاء المجلس المصري للتخصصات الصحية وغيرها.

Arab Republic of Egypt

وزارة التعليم العالي والبحث العلمي

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الاستراتيجية الوطنية
للتعليم العالي والبحث العلمي ٢٠٣٠

مقدمة

يعد التعليم هو قاطرة التقدم وأساس البناء وآلية الحراك الاجتماعي والموجه في صياغة المستقبل، ولذا فإن التطوير المستمر في منظومة التعليم العالي هو أمر حتمي؛ حتى تظل هذه المنظومة الوطنية ملائمة لمتطلبات الحاضر والمستقبل.

ولن يتحقق ذلك إلا بوجود إستراتيجية وطنية شاملة ومتكاملة للتعليم العالى والبحث العلمى في مصر، خاصة في ظل التحديات الاجتماعية والسياسية والاقتصادية والتكنولوجية التي يشهدها العالم؛ و ذلك بهدف تعزيز العلاقات الدولية في مجالي التعليم العالي والبحث العلمي، والمساهمة في دعم الاقتصاد المصري، فضلاً عن النهوض بمنظومة التعليم العالي والبحث العلمي وفق المعايير العالمية، ووضع المؤسسات التعليمية والبحثية المصرية في مصاف نظيراتها الدولية؛ لجذب المزيد من الطلاب والباحثين الوافدين من كافة أنحاء العالم بما ينعكس على العملية التعليمية والقدرة التنافسية الدولية للتعليم المصري في جميع أنحاء العالم.

وفي ضوء ذلك تم إطلاق الإستراتيجية الوطنية للتعليم العالى والبحث العلمي، يوم الثلاثاء الموافق ٧ مارس ٢٠٢٣ ، برعاية كريمة من رئيس مجلس الوزراء د.مصطفى مدبولي، وبحضور د.أيمن عاشور وزير التعليم العالى والبحث العلمى، ود.محمد عوض تاج الدين مستشار رئيس الجمهورية للشئون الصحية والوقاية، والسادة وزراء التخطيط والتنمية الاقتصادية، الصحة والسكان، الاتصالات وتكنولوجيا المعلومات، المالية، التربية والتعليم والتعليم الفنى، الشباب والرياضة، الزراعة واستصلاح الأراضى، القوى العاملة، وعبر كلمة مسجلة وزراء التعاون الدولى، التجارة والصناعة، وحضور السفير/جاريث بايلى السفير البريطاني بالقاهرة.

أطلقت الاستراتيجية الوطنية للتعليم العالي و البحث العلمي تحت رعاية دولة رئيس الوزراء ، بحضور د. محمد عوض تاج الدين مستشار رئيس الجمهورية لشئون الصحة والوقاية، ووزراء التخطيط والتنمية الاقتصادية، الصحة والسكان، الاتصالات وتكنولوجيا المعلومات، المالية، التربية والتعليم و التعليم الفني، الشباب والرياضة، الزراعة واستصلاح الأراضي، القوى العاملة، وعبر كلمة مسجلة وزراء التعاون الدولي، التجارة والصناعة، وحضور السفير جاريث بايلى السفير البريطاني بالقاهرة.

وخلال احتفالية إطلاق الإستراتيجية الوطنية للتعليم العالي والبحث العلمي، قدم د. أيمن عاشور عرضاً تفصيليًا حول الإستراتيجية، مشيرًا إلى أن الإستراتيجية تقوم على ثلاثة محاور رئيسية:

المحور الأول:
التنمية المستدامة وعلاقتها بالتنمية الشاملة

تقوم الإستراتيجية الوطنية التعليم العالي والبحث العلمي على تحقيق أهداف التنمية المستدامة (رؤية مصر ٢٠٣٠)؛ لدعم جهود الأقاليم الجغرافية على مستوى الجمهورية، وكذلك أصحاب المصلحة نحو تحقيق هدف تنموي شامل لقطاع تعليمي مستدام وناجح في جميع أنحاء الجمهورية.

يأتي ذلك من خلال:

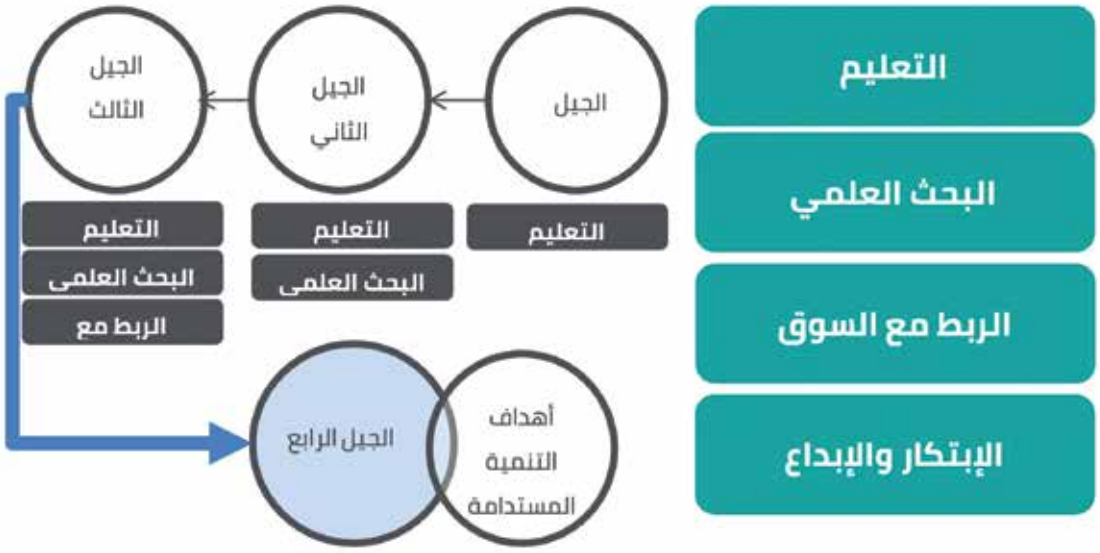
- توفير مناخ محفز لتوطين وإنتاج المعرفة
- ربط مخرجات المعرفة والابتكار بالأولويات الوطنية
- تحسين جودة العملية التعليمية وفقًا لمعايير الجودة العالمية
- زيادة فرص الالتحاق بالتعليم العالي في جميع أنحاء الجمهورية، بما في ذلك المناطق التي تعاني من نقص في عدد طلاب الجامعات
- ربط نظام التعليم العالي بالمؤسسات الصناعية ومتطلبات سوق العمل بشكل يحد من البطالة، ويوفر للخريجين فرص عمل تتناسب مع مؤهلاتهم العلمية
- العمل على خلق بيئة مواتية للابتكار والإبداع مع تفعيل نظام وطني متكامل لدعمهم..

المحور الثاني:
الجيل الرابع من التعليم العالي والبحث العلمي.

تتجه رؤية الوزارة نحو تأسيس الجيل الرابع من الجامعات لمواكبة التوجهات العالمية من خلال دعم ريادة الجامعات المصرية في صناعة التعليم وتعزيز دورها كجهة مؤثرة وصانعة للقرار في تلبية احتياجات سوق العمل، بدلاً من أن تكون مجرد شريك يستجيب لمتطلبات الصناعة.

وتعتمد جامعات الجيل الرابع على عدة مكونات أساسية، وهي: سهولة انتقال الطلاب والباحثين، ربط الجامعات بالصناعة وأولويات الدولة، الابتكار المؤثر على تنمية البحث العلمي والتطوير الاقتصادي، التحول الرقمي الذي يُمَّكن من نقل المعرفة والتكنولوجيا، الاستثمارات والمؤسسات، تبنى الأنظمة التعليمية المتطورة، ومتابعة أداء الجامعات وترتيبها في ضوء مؤشرات التصنيف العالمية.

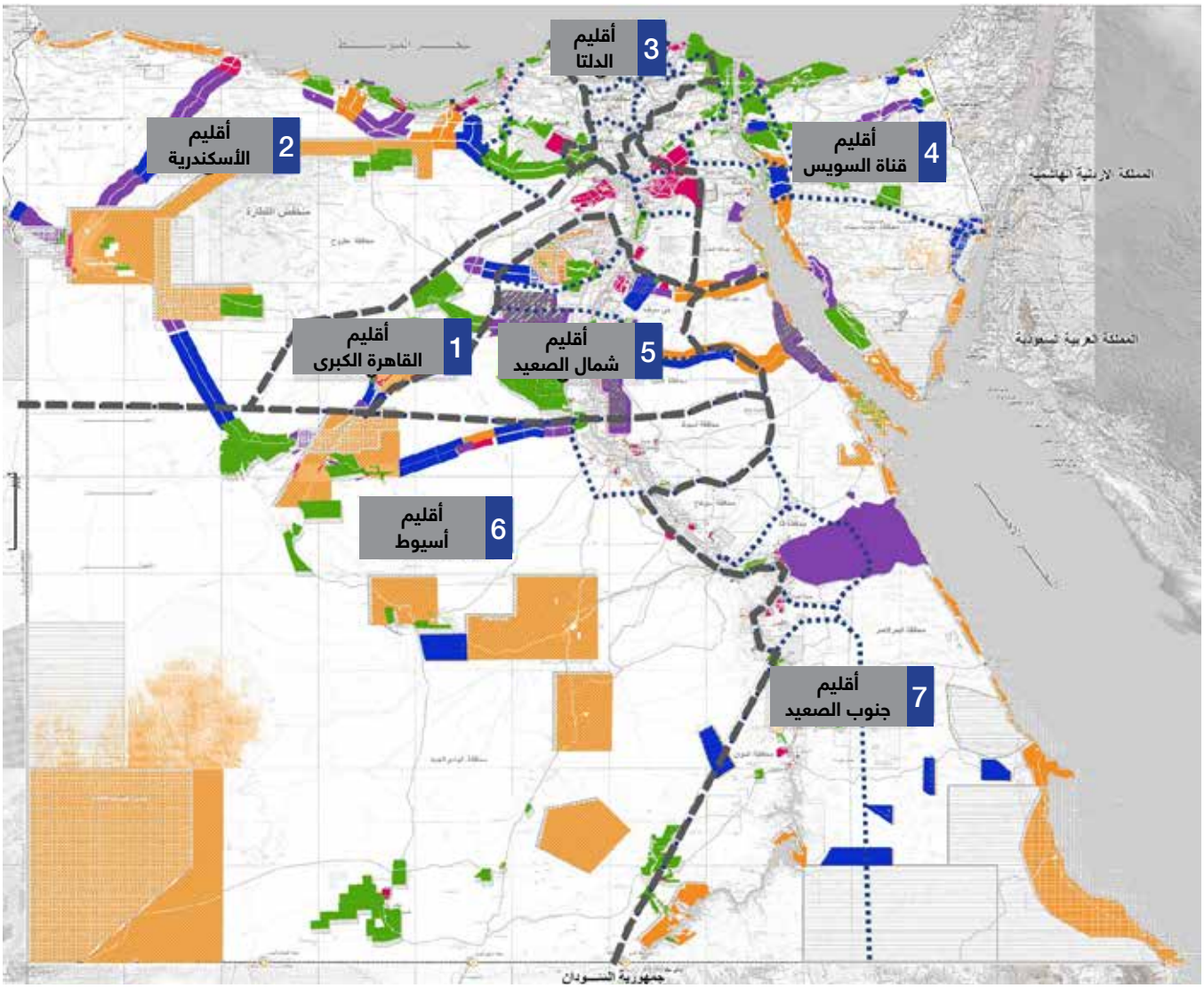
الجامعات وترتيبها في ضوء مؤشرات التصنيف العالمية.



المحور الثالث:
خطط التنمية الإقليمية الشاملة ٢٠٣٠.

يعد قطاع التعليم العالي والبحث العلمي من الركائز التي يعتمد عليها قياس وتقييم أداء الاقتصاد، من حيث التحول نحو الاقتصاد القائم على المعرفة، والبنية التحتية الرقمية، والنظام البيئي الداعم للابتكار، والنظام المؤسسي والحوافز الاقتصادية، حيث يمكن للتعليم العالي دعم خطة التنمية الاقتصادية من خلال تعزيز الاستثمار في قطاعي التعليم والبحث العلمي، وتحسين البنية التحتية، وبناء البنية التحتية الرقمية؛ لسد الفجوات والاستفادة من مخرجات البحث والابتكار، والاستفادة من التكنولوجيا في القطاع الصناعي بما يسهم في زيادة معدل الإنتاج وتحقيق أهداف خطة التنمية المستدامة للدولة (رؤية مصر ٢٠٣٠)، خاصة أن خطة التنمية المستدامة تعطى الأولوية للقطاعات الرائدة سريعة النمو، والإنتاجية العالية، ومنها: التعليم العالي والبحث العلمي.

وأشار د. أيمن عاشور إلى أن المبادئ السبعة التي تشكل خارطة طريق للإستراتيجية، هي (التكامل، التخصصات المتداخلة، التواصل، المشاركة الفعالة، الاستدامة، المرجعية الدولية، الابتكار وريادة الأعمال)، مُؤكِدًا أنها تدعم تحويل المؤسسات التعليمية إلى مؤسسات ابتكارية تُسهم فى جذب الكوادر العلمية المتميزة، وبناء نظام بيئي قوى وأشار د. أيمن عاشور إلى أن المبادئ السبعة التي تشكل خارطة طريق للإستراتيجية، هي (التكامل، التخصصات المتداخلة، التواصل، المشاركة الفعالة، الاستدامة، المرجعية الدولية، الابتكار وريادة الأعمال)، مُؤكِدًا أنها تدعم تحويل المؤسسات التعليمية إلى مؤسسات ابتكارية تُسهم فى جذب الكوادر العلمية المتميزة، وبناء نظام بيئي قوى يُسهم في تطوير المؤسسات التعليمية.



مجال العمران
مجال التجارة والخدمات اللوجستية
مجال السياحة
مجال الصناعة والتعدين
مجال الزراعة

التكامل Integration
التخصصات المتداخلة Interdisciplinarity
الاتصال Connectivity
المشاركة الفعالة Effective Participation
الاستدامة Sustainability
المرجعية الدولية International Reference
الريادة والإبداع Innovation & Entrepreneurship

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وزارة التعليم العالي والبحث العلمي

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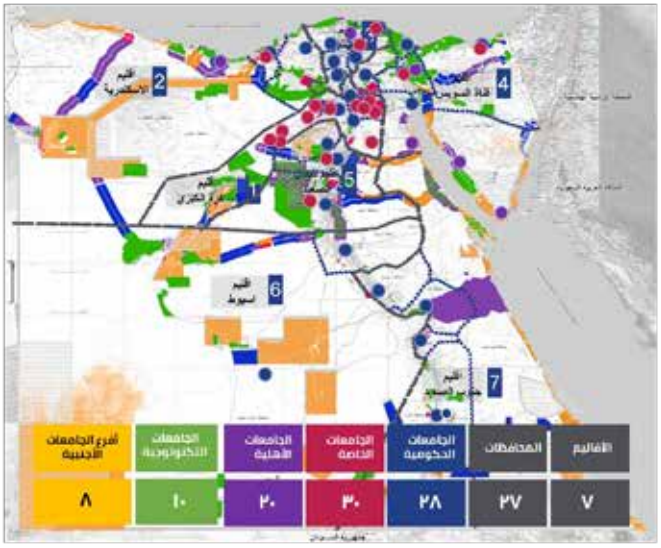
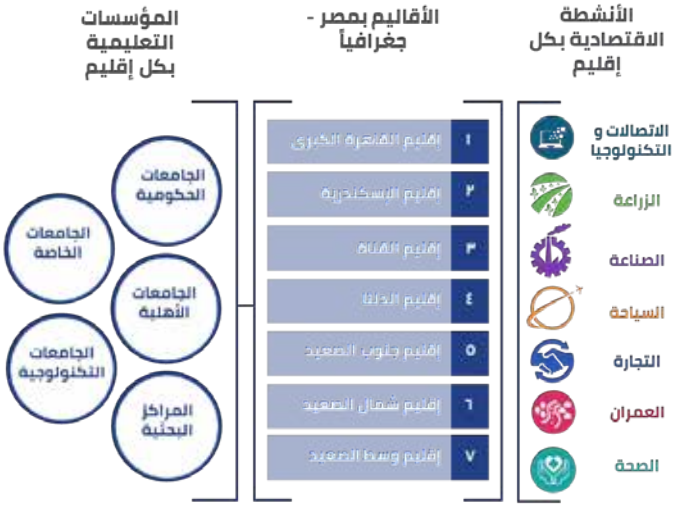
المبادئ السبعة للرؤية المستقبلية لتطوير التعليم العالي والبحث العلمي:

١. التكامل
٢. التخصصات المتداخلة
٣. الاتصال
٤. المشاركة الفعالة
٥. الاستدامة
٦. المرجعية الدولية
٧. الابتكار وريادة الأعمال

١. التكامل





يقوم المبدأ الأول على تحقيق التكامل الفعلي بين عناصر منظومة التعليم العالي ومؤسسات الإنتاج والتنسيق بينهم للعمل بصورة تكاملية؛ تسد الفجوة بين البرامج التعليمية والاحتياجات الواقعية لكل إقليم، في إطار الأنشطة الاقتصادية التي يتميز بها.

ويتطلب تحقيق التكامل تشكيل تحالف لكافة المؤسسات التعليمية في كل إقليم، تقييم معدلات الأداء لكل مؤسسة، دراسة تأثير البعد الاقتصادي وفرص العمالة المرتبطة بكل إقليم، فضلاً عن التدقيق في التوزيع الديموغرافي الحالي والمستقبلي للطلاب وتأثيره على توزيع وأعداد المؤسسات التعليمية، ودراسة البرامج الأكاديمية المطلوبة لخدمة الأنشطة الاقتصادية، بالإضافة إلى إمكانية تبادل الأكاديميين والموظفين داخل المؤسسات في نفس الإقليم الجغرافي بما يحقق التكامل، مع الاعتماد على المدخل الإقليمي لكل جامعة للتركيز على الأنشطة التنموية في مختلف الأقاليم الجغرافية للجمهورية.

إن كل إقليم يضم عددًا من الجامعات الحكومية والأهلية والخاصة والتكنولوجية بالإضافة إلى المراكز البحثية، ويتميز بعدد من الأنشطة الاقتصادية التي قد لا تتوفر في باقي الأقاليم. و حيث أن لكل من هذه الأقاليم سماتها وخصائصها الاقتصادية والاجتماعية التى تميزها عن غيرها من الأقاليم، قد فطنت خطة التنمية المستقبلية لمصر٢٠٣٠ لذلك وقامت ببناء أهدافها علي الاستغلال الأمثل لإمكانيات كل إقليم

ويمكن أن يحدث التكامل على مستويين:

- المستوى الأول من خلال تحالف المؤسسات التعليمية مع المناطق الجغرافية لخدمة كل منطقة.
- المستوى الثاني من خلال تحالف المؤسسات التعليمية مع المؤسسات الاقتصادية والإنتاجية؛ لتحديد الاحتياجات التعليمية لكل نشاط اقتصادي، والاستفادة من مخرجات المؤسسات التعليمية لتحقيق الأهداف المنشودة من المؤسسات الاقتصادية وبالتالي زيادة معدل الإنتاج.

ويساعد التكامل التحالف الإقليمي للمؤسسات التعليمية وجميع أجهزة الدولة على توحيد جهودها وتحقيق رسالتها بشكل فعال.

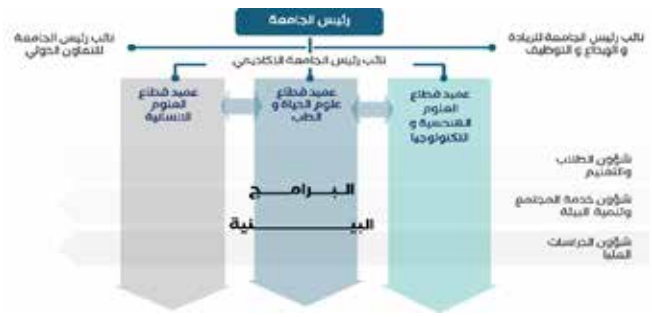
٢. التخصصات المتداخلة

ينشأ مفهوم التخصصات المتداخلة في ظل المشكلات المعقدة التي يشهدها المجتمع؛ بهدف التصدي لهذه المشاكل وحلها من خلال صياغة برامج تعليمية حديثة تقوم على تداخل التخصصات.

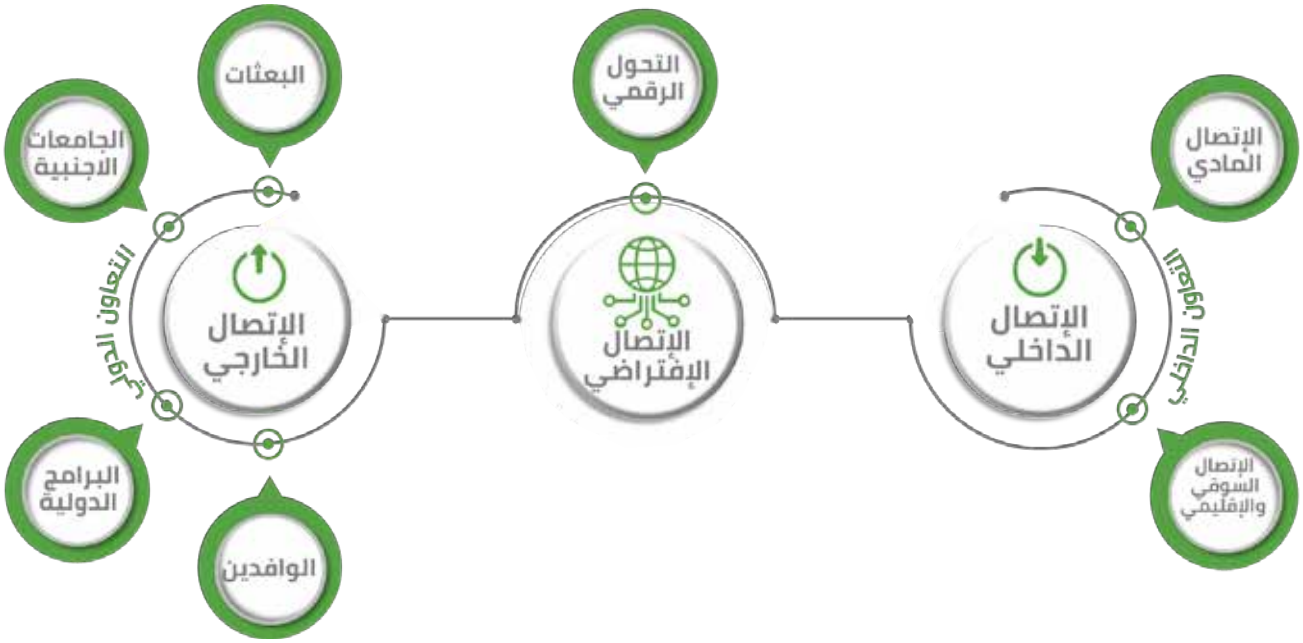
ولبناء التخصصات المتداخلة تنقسم الكليات إلى مجموعة من القطاعات المتجانسة، خاصة أن النظرة المستقبلية لسوق العمل تشير إلى أنه قد يشهد سيطرة لعدد من المجالات الرئيسية، بما يجعل هناك احتياج لمجالات تخصصية متداخلة، تسهم في تجهيز خريج قادر على حل المشكلات المتشعبة ومواجهة تحديات العصر والتعامل معها بشكل إبداعي مبتكر.

تقوم فكرة البرامج البينية على تقديم برامج تجمع تخصصين أو أكثر، وتقوم مبادئها على تقسيم العلوم الى ثلاثة اقسام أساسية -العلوم الإنسانية، علوم التكنولوجيا، وعلوم الحياه - تنبع منها مصادر العلوم الأكاديمية. مما يدعم مفهوم التكامل الذي تم تناوله سابقًا حيث أن الجامعات الحكومية والجامعات الأهلية والجامعات التكنولوجية ستصبح هي الحاضنة للكليات الأم التي تدعم البرامج ذات التخصصات البينية، ويتطلب ذلك تعديل هيكل إدارة المؤسسات التعليمية ليتكون من رئيس الجامعة وثلاثة نواب لرئيس الجامعة - نائبًا للتعليم الأكاديمي، نائبًا للريادة والإبداع والتوظيف و نائبًا للتعاون الدولي - مع العمداء.

قد يحدث تداخل لبعض التخصصات في نفس المجال أو بين عدة مجالات وتخصصات مختلفة بطريقة مرنة لاستيعاب الاختلافات بين الجامعات، والذى سينعكس إيجابًا على النتائج التعليمية، ويساهم في توفير فرص عمل جديدة تدعم الخريجين بالآراء والمقترحات التى تساعدهم على تحقيق فهم شامل لحل المشكلات ومواجهة التحديات التى يشهدها العالم.



٣. الاتصال



إن الاتصال والتعاون بين عناصر نظام التعليم العالي إقليميًا وعبر الحدود هو اتجاه آخذ في التوسع، حيث تقوم المزيد من البلدان بالمبادرة والمشاركة في التعاون الإقليمي والتعاون عبر الحدود كاستراتيجية لتعزيز أنظمة التعليم العالي.

علاوة على ذلك، فإن التعاون عبر الحدود في التعليم العالي يوفر آلية واعدة لتوليد الإيرادات وتوظيف الطلاب، وتحسين الجودة، وفي بعض الأحيان وسيلة لتحسين البحث العلمي.

ويقوم الاتصال على مستويين:

- "الاتصال الداخلي" داخل المجتمع، و الذي سيتم إنشاؤه بين مختلف مؤسسات التعليم العالي ومراكز البحوث داخل مصر (الاتصال المادي وقطاع السوق والاتصال الإقليمي والاتصال الافتراضي)

- "الاتصال الخارجي" عبر الحدود ويتضمن مفهوم التعاون الدولي، فعلى سبيل المثال تم إنشاء العديد من المؤسسات التعليمية في العاصمة الإدارية الجديدة كفروع لجامعات أجنبية مثل جامعة كوفنتري، وجامعة هيرتفوردشاير وغيرهم, كما يتضمن أيضًا التعاون مع منظمات دولية ومؤسسات عالمية والأمم المتحدة كاليونسكو ومنظمة العمل الدولية وغيرهم.

وكلا المستويان يبنيان أرضية للتعاون ويسهل الوصول، ويدعم نقل المعرفة ويخلق مناخًا للابتكار.

والاتصال في شكله الملموس هو سمة أساسية لجميع جوانب الحياة الجامعية على الرغم من تجاهلها في كثير من أدبيات التعليم العالي ذات الصلة. أما الاتصال الإقليمي فهو الذى يتم بين جميع الاتحادات في مناطق مختلفة لتلبية احتياجات كل اتحاد من المناطق الأخرى من طرق تعليمية، وأبحاث علمية أو تخصصات محددة أو برامج جديدة أو موارد بشرية تخدم تخصصات بعينها.

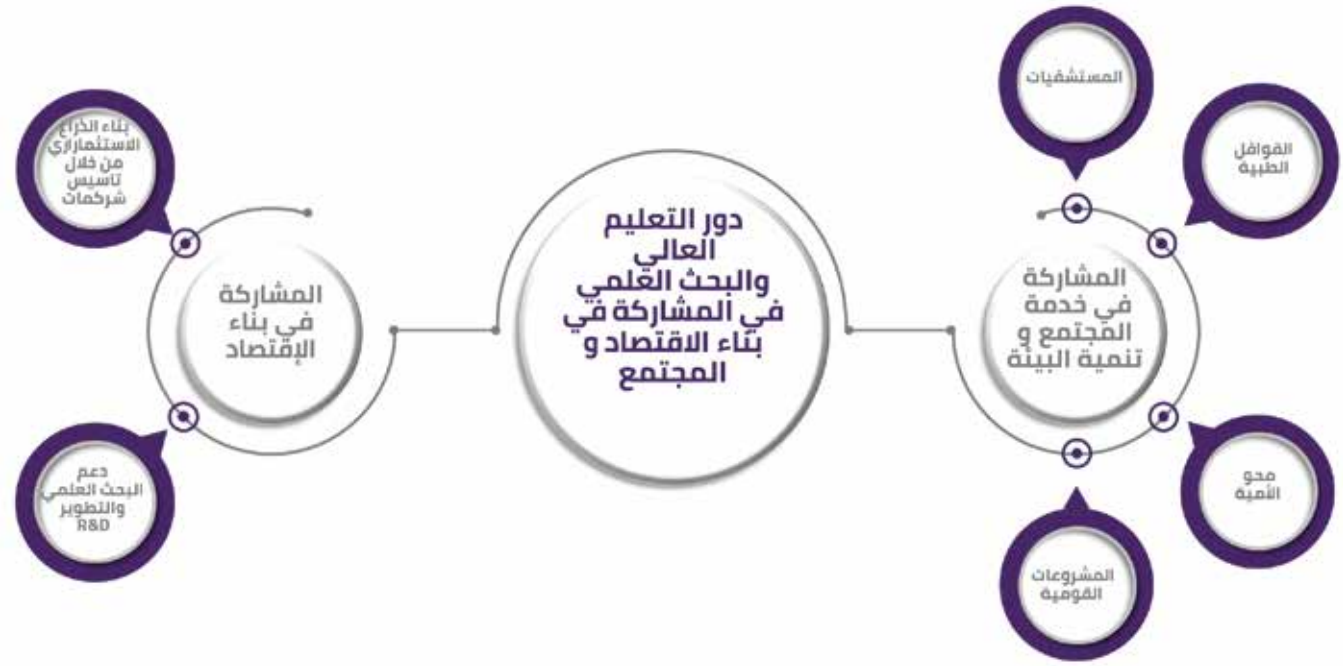
وفى ضوء التحول الرقمي يتطلب الأمر المزيد من الاهتمام للشكل "غير الملموس" للاتصال، حيث شهد مفهوم التعلم الإلكتروني تقدمًا كبيرًا خلال جائحة COVID-١٩، واستطاع أن يضمن تحقيق وصولًا أكبر للتعليم العالي، وفعالية في الوقت وانخفاض التكلفة، فضلاً عن تقديم عملية تعلم ديناميكية وسريعة، ونتائج أفضل يمكن متابعتها.

منصة "ادرس في مصر":

منصة ادرس في مصر هي المغامرة التعليمية الجديدة التي تصنع الفرق كله وتساعد على الذهاب إلى مكان للتعليم والمرح وتوفر سهولة الوصول إلى جميع كيانات التعليم العالي في مصر وذلك تنفيذا لتوجهات الدولة الخاصة بالارتقاء بمنظومة الطلاب الوافدين ولتصبح مصر أكبر مركز تعليمي متميز في الشرق الأوسط تحقيقًا لأهداف استراتيجية مصر ٢٠٣٠ وتطوير منظومة الخدمات المقدمة للطلاب الوافدين، وكذا جذب وتسهيل إجراءات قيد الطلاب الوافدين بالجامعات والمعاهد العليا المصرية.

ومن أهم مميزات هذه المبادرة, دعم مصالح الطلاب الوافدين, تزويد الطلاب الوافدين بكل ما يخص الدراسة في مصر, وخدمة الطلاب الوافدين قبل وأثناء وبعد الدراسة في مصر, وتوفير جميع المعلومات التي يحتاجها الطلاب في التقديم والمستندات المطلوبة, والتنسيق الداخلي تحت رعاية وزارة التعليم العالي والبحث العلمي المصرية, وضمان تحقيق الإستفادة القصوى للطلاب، والتواصل معهم وشرح تفاصيل الفرص المتاحة للدراسة في مصر بالنسبة للطلاب الوافدين وتوفير خدمة موحدة للطلاب منعًا للتشتت عن طريق توحيد المصدر و مساعدة الطلاب الدوليين على اتخاذ قرار الدراسة في مصر والإستثمار في تعليم الشباب، فهم بناة المستقبل وتقديم خدمة السياحة التعليمية في مصر وتقديم خدمات تعليمية تواكب عصر تكنولوجيا المعلومات الذي نعيشه واستعادة مصر لمكانتها كمنبر العلم في الشرق الأوسط والعالم أجمع.

٤. المشاركة الفعالة



غالبًا ما يتم ربط المشاركة بالمناقشة، والتي تتضمن عادةً فتح حوارات مع المعنيين من أصحاب المصلحة في المجتمع بأكمله، وتشمل المشاركة أيضًا تبادل نقاشات قصيرة بين الأطراف المعنية داخل العملية التعليمية والمسئولين عن نظام التعليم العالي. وتتطلب المشاركة الفعالة تفاعلًا إيجابيًا بين كل من: الحكومة، والمؤسسات المدنية، وأصحاب الأعمال التجارية، والمؤسسات التعليمية الداعمة.

كما أصبح للجامعات القدرة علي تأسيس شركات تمثل الظهير الاستثماري و الإقتصادي للجامعات و يتميز هذا الأمر بكونه قادرًا علي دمج الدور الفعال للجامعات في خلق الأفكار و في ابتكار المعارف مع سوق العمل و لكن من خلال نموذج يسمح للجامعة بالريادة و تحديد الأولويات التي يمكن من خلالها دفع عجلة الاستثمار بقيم ترسخ التنمية المستدامة و تدعم الابتكار و تتجنب الاستهلاك. كما يقوم هذا الظهير في الأساس علي الإبتكار و مفاهيم ريادة الأعمال و التي غالبًا ما تأتي من الشباب و هو أمر يدعم الأفكار الجديدة و يتماشي مع مفهوم دور الجامعات في الجيل الرابع سيتمكن كل إقليم من خلق تحالفات اقليمية بظهير اقتصادي يمكن الجامعات من المشاركة الفعالة في آليات الإقتصاد على مستوى الإقليم في جميع مناحي التنمية.

وتعد حرية الفكر والاستفسار للمجتمع الأكاديمي هي المكون الأكاديمي اللازم لمؤسسات التعليم العالي لتعزيز المعرفة والابتكار، وحرية توصيل هذه المعرفة وفقاً لمعايير الأخلاقيات الأكاديمية والنزاهة. وتلتزم الجامعات بالمشاركة في الحوار مع بقية أطراف المجتمع والمجتمعات الدولية من حولها، إلى جانب المشاركة في المناقشات العامة، والتصدي للتحديات المجتمعية الرئيسية، والسعي لخلق بيئة تعليمية مواتية. ويخدم المكون الاقتصادي للمؤسسات التعليمية بشكل أساسي الأغراض الأكاديمية لنظام التعليم العالي، حيث يتم التركيز على الاستثمارات المحلية والأجنبية في قطاع التعليم، كما أن إشراك المؤسسات التعليمية في القطاعات الاقتصادية يؤدى إلى خلق فرص لاستثمارات محتملة، وكذلك تطوير المشاريع على أرض الواقع في المناطق الجغرافية التابعة لها. وهناك حاجة لمزيد من الاستثمارات في قطاعات البحث والتعليم والابتكار لمواجهة تحديات العقد الجديد، والمساهمة في تعزيز قدرة مصر على الوصول إلى المعرفة الجديدة والتكنولوجيات الرئيسية وتطويرها.

خدمات تعزز المشاركة الفعالة كالمستشفيات:

انطلاقًا من مبدأ التطوير المستمر للمستشفيات الجامعية، تم إنجاز العديد من المشاريع وفقًا لخطة إستراتيجية لتقديم الرعاية الصحية للمواطنين. حيث شاركت مستشفيات الجامعات بشكل كبير وفعال في رؤية التطوير الاستراتيجي لوزارة التعليم العالي والبحث العلمي وأثرت هذه المشاركة بشكل إيجابي على عملية التعليم.

طورت مصر النظام الصحي بالمستشفيات الجامعية وبدأت في عملية التحول الرقمي الشاملة لجميع مؤسسات التعليم العالي كجزء من مشروع ميكنة المستشفيات الجامعية، طورت مصر خريطة للنظام الصحي العالمي وفقًا لقياسات HIMSS من خلال توحيد ملف طبي موحد لكل مريض على مستوى الجمهورية على النحو التالي:

- تقديم الخدمات الصحية لجميع المواطنين على مستوى الجمهورية.
- توفير البيانات اللازمة لخدمة البحث العلمي.
- إغلاق أبواب الفساد وقدرات الدولة من خلال تتبع كافة عناصر النظام الصحي.
- تعظيم الأجهزة الطبية وعدم تكرار استبدالها وتكرار شراء الأجهزة داخل نفس السكان.
- عمل جرد لجميع الأجهزة الطبية والخدمات الطبية في جميع المستشفيات لخدمة القطاع الصحي.
- يسمح البرنامج بالتواصل مع نظام العلاج العالمي و الربط مع جميع الجهات الصحية في مصر ومنع استخدام الاستمارات الورقية.
- توفير البيانات والإحصاءات الفورية لدعم متخذي القرار
- رفع الكفاءة التشغيلية للمستشفيات الجامعية وتحقيق الاستخدام الأمثل للموارد المتاحة.
- بناء بنية تحتية كاملة لخدمة نظام معلومات المستشفيات لجميع المستشفيات الجامعية.
- كفاءة أكبر في تقديم أفضل خدمة للمواطنين في جميع أنحاء الجمهورية.

٥. الاستدامة

إن تعظيم الاستفادة من الموارد المتاحة وتقليل فرص الهدر يضمن لنا الحفاظ على استمرارية العملية التعليمية سواء من خلال الجامعة أو أماكن العمل أو المعاملات اليومية.

ويهدف نهج التعليم من أجل الاستدامة (EFS) إلى تنمية قدرات الطلاب والجامعات والمجتمعات وتزويدهم بقيمة السعي الحالي والمستقبلي للاستدامة في التعلم، سواء في حياتهم الشخصية أو داخل مجتمعهم وأيضًا على نطاق عالمي.

وتتمثل منهجية الاستدامة في التعليم العالي في أن تصبح الجامعات مجتمعًا للتعلم والابتكار والإنتاجية مدى الحياة. ويمكن لمفهوم "التعليم من أجل الاستدامة" أن يسهم في تغيير العديد من الممارسات غير المستدامة؛ مثل الاستهلاك المفرط للموارد، وتطوير موارد التعليم وتكييفها وربطها بالإنتاج والاستهلاك المستدامين.

وتحقق الاستدامة دمجًا لثلاثة أبعاد متساوية، هي: البعد الاقتصادي، والبعد الاجتماعي، والبعد البيئي

ويمكن وصف هذه الأبعاد كالآتى:

١. البعد الاقتصادي للاستدامة: ويركز على كافة الجوانب المتعلقة بسبل زيادة الموارد واستخدامها بالشكل الصحيح، وطرق دعم الاقتصاد القائم على المعرفة، وتقليل التخصصات الدراسية التقليدية غير المجدية مالياً واقتصادياً، بالإضافة إلى التركيز على الاستثمار في مجال التعليم والبحث العلمي.

٢. البعد الاجتماعي: ويركز على توطيد العلاقة بين الطالب والجامعة، وفتح قنوات اتصال بينهما من خلال نظام التكافل والرعاية، كما يهتم بتمكين المرأة في مجال التعليم العالي والمسؤولية الاجتماعية للشركات تجاه قطاع التعليم والبحث العلمي.

٣. البعد البيئي: يركز على خلق بيئة مواتية للابتكار والإبداع، وتحسين حرم الجامعات والمباني، وإنشاء التخصصات والبرامج الدراسية التي تخدم البيئة، وتساعد في الحفاظ على الموارد البيئية.

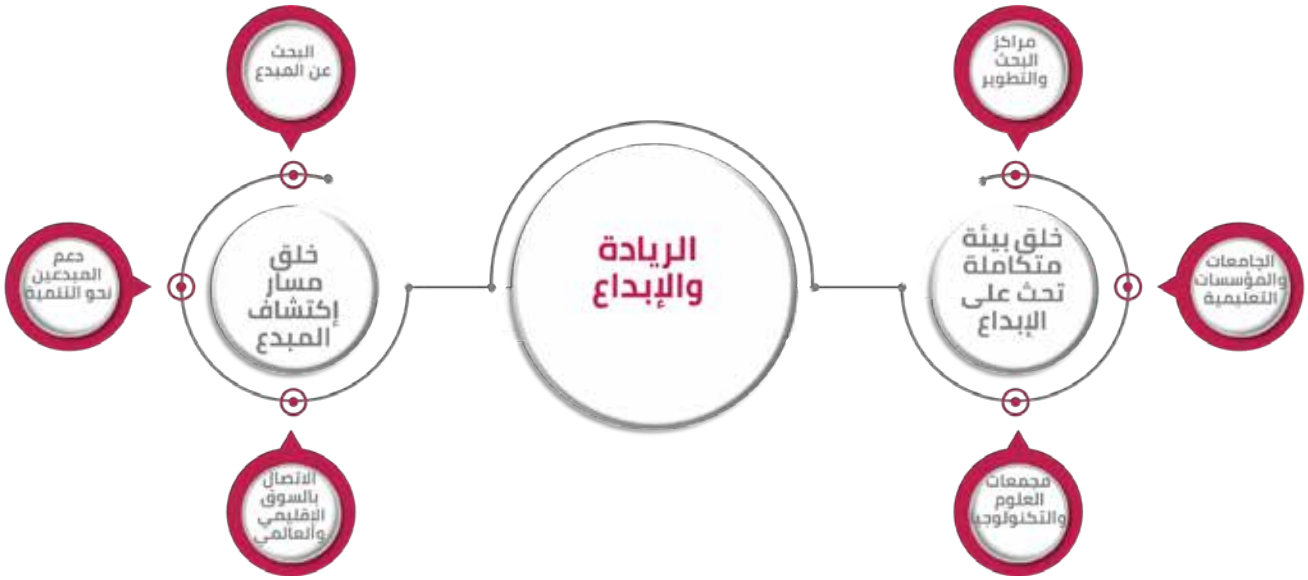
٦. المرجعية الدولية

لقد زاد توجه مؤسسات التعليم العالي نحو المرجعية دولية مع نمو الشراكات المؤسسية، وزيادة سهولة انتقال الطلاب عبر الحدود، ونحن نسعى للحصول على جودة التعليم العالي ليس على المستوى الوطني فقط، ولكن على المستوى الدولي أيضًا. وعلى الرغم من زيادة الجهود المبذولة لضمان الجودة الوطنية والإقليمية للمؤسسات التعليمية حاليًا على مستوى الدولة، إلا أننا نبحث عن دعم القدرة التنافسية الدولية لمؤسساتنا، والجودة المبنية من خلال التركيز بشكل أساسي على قيم التنوع الثقافي، والسيادة الوطنية.

ويتطلب التحول إلى نظام دولي قائم على المنافسة تلبية "معايير الجودة الدولية" في التعليم العالي من خلال فهم معايير الجودة الأكاديمية، وتحقيق تصنيف دولي متقدم لمؤسسات التعليم العالي المحلية، والحصول على الاعتماد الدولي، ونقل الخبرات الدولية إلى نظام التعليم العالي لدينا. يعتمد مبدأ المرجعية الدولية علي التركيز علي التنافسية في جودة التعليم وسعر الخدمة و الاعتماد الأساسي على التنافسية في الموقع الإستراتيجي للدولة المصرية مما يسمح بجذب الجامعات المصرية للدول المحيطة "استقطاب الوافدين و انشاء أفرع الجامعات الدولية و سيأتي ذلك من خلال التركيز علي وجود مرجعية دولية لجودة التعليم في الجامعات من خلال تصنيف وترتيب الجامعات. سيتضمن هذا المبدأ خلق منظومة تنافسية لقياس معدلات أداء الجامعات المصرية و علاقاتها مع خطط التنمية المحلية من خلال منصة متابعة و سيسمح ذلك التوجه بخلق طابع التنسيق المحلي يسمح للطلاب الدوليين الالتحاق بالجامعات المصرية.

وقد وضعت وزارة التعليم العالي والبحث العلمي إستراتيجية للارتقاء بتصنيف الجامعات المصرية في التصنيفات العالمية، كما تركز إستراتيجية الوزارة على إنشاء تخصصات دولية جديدة، وتعزيز مفاهيم البرامج المشتركة، والبرامج ذات التخصصات المتداخلة في الجامعات المصرية، واعتماد نظام تسجيل دولي جديد، وتطوير نظام التسجيل الوطني، ودعم التعاون الدولي في مجال البحث العلمي، والذى يُسهم في رفع تصنيف الجامعات المصرية على المستوى العالمي، وكذا ربط الجامعات باحتياجات قطاع الصناعة، حيث يعتبر حجم مشاركة الجامعات في دعم الصناعة بالابتكارات والاختراعات العلمية والاستشارات التي تقدمها أحد العوامل المهمة في تقييم الجامعات داخل التصنيفات العالمية. كما تربط إستراتيجية الوزارة بين تحقيق الشراكة الدولية مع الالتزام بجودة وكفاءة التعليم العالي، والاعتراف بالشهادات المحلية دوليًا.

٧. الابتكار وريادة الأعمال



تُظهر تجارب البلدان النامية التي أصبحت قوى اقتصادية كبيرة أن مثل هذا التحول لا يمكن تحقيقه إلا من خلال نظام بيئي متكامل يدعم الابتكار ويربط بين مختلف أصحاب المصلحة، وهذا النظام البيئي لا يشمل توليد التكنولوجيا المبتكرة فحسب، بل يشمل أيضًا القوانين والتشريعات الداعمة التي تحفز الابتكار، بالإضافة إلى توفير الموارد المادية والبشرية، من أجل بناء نظام داعم للابتكار يساهم في تعزيز القدرة التنافسية العالمية لمؤسساتنا.

وقد خلصت التجارب إلى أن تحقيق مفهوم الابتكار وريادة الأعمال يتم من خلال الربط الثلاثي بين مفاهيم التعليم والأعمال والبحث، (والتي تشكل مفاهيم جامعات الجيل الرابع)؛ على النحو التالي:

١. توفير طرق جديدة للربط بين المسار الأكاديمي والصناعي والبحثي.
٢. وضع طرق جديدة للتدريس تركز على الابتكار والإبداع وريادة الأعمال.
٣. إنشاء مجالات جديدة لضمان تبادل نقل المعرفة والخبرة العملية بين قطاع الأعمال والجانب الأكاديمي.

ويمكن تصنيف جميع الاستراتيجيات المقترحة لخدمة ثلاثة مسارات رئيسية:

١. الابتكار: إثارة واستكشاف وتطوير ودعم المبتكرين وابتكاراتهم
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٣. البنية التحتية والنظام البيئي: تقوية وبناء البنية التحتية اللازمة وعُقد النظام الإيكولوجي

ويمكن أيضًا تصنيفها من حيث طبيعة مخرجاتها:

١. استراتيجيات الإثارة والاكتشاف
٢. إستراتيجيات توليد الطاقة وتطويرها
٣. بناء الاستراتيجيات

ويتم تصنيف الإستراتيجيات أيضًا بناءً على مدتها الزمنية، ويمكن تصنيفها على أنها:

١. المدى القصير: السنة الأولى
٢. المدى المتوسط: سنتان ٢-٣
٣. المدى الطويل: السنوات ٤-٥

Arab Republic of Egypt

وزارة التعليم العالي والبحث العلمي

Ministry of Higher Education
& Scientific Research

EGYPTIAN HIGHER EDUCATION & SCIENTIFIC RESEARCH BLUEPRINT 2030

The blueprint 2030 has been produced under the auspices and supervision of HE Minister of Higher Education & Scientific Research **Prof. Dr. Mohamed Ayman Ashour**

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FOREWORD BY HE PRESIDENT

ABDEL FATTAH EL SISI

Education is the cornerstone of sustainable national development, serving as a driving force for nations to move forward and make transformative changes within society. In this context, higher education emerges as a key component of the educational landscape, acting as the forefront for intellectual and societal development. As we navigate the complexities of the modern world, I am proud to introduce the Egyptian Higher Education and Scientific Research Blueprint—a visionary roadmap that reflects our commitment to empowering our youth, fostering innovation, and positioning Egypt as a global leader in education and research.

This blueprint is not merely a plan; it is a step to expand access to quality higher education for all Egyptians, regardless of their background or location. Through strategic investments in scholarships, infrastructure, and digital connectivity, we will unlock the potential of every aspiring student across our great nation.

Industry-academia collaboration is a key point of this blueprint. We envision a seamless connection between the education sector and industry, equipping our graduates with practical skills and fostering a spirit of entrepreneurship. Together, we will build a workforce that meets the demands of the knowledge economy.

To achieve this transformative vision, the collective efforts of universities, faculty, students, policymakers, and the private sector are essential. I call upon every Egyptian to support this initiative for shaping an education system that not only transforms individual lives but also propels Egypt toward unprecedented prosperity.

I express my sincere appreciation to everyone who has contributed to this blueprint. Your dedication and belief in the power of education are instrumental in making this vision a reality. With your continued support, we will build a higher education system that inspires generations and secures a brighter future for our beloved Egypt.

Abdel Fattah El Sisi
President of the Arab Republic of Egypt

FOREWORD BY PRIME MINISTER

MOSTAFA MADBOULY

The Egyptian higher education system stands as a testament to our nation's commitment to academic excellence, progress, and innovation. Over the past decade, we have witnessed remarkable growth and transformative advancements, marked by the expansion of national and technological universities, the establishment of international foreign university branches, and a concerted focus on technological integration.

Immense initiatives have propelled our higher education system onto the global stage, earning recognition in critical areas such as research publications, internationalization, innovation, entrepreneurship, and international reference. The achievements we present are a testament to the dedication and innovative spirit of the Egyptian academic community.

Yet, as we acknowledge our accomplishments, the Ministry of Higher Education and Scientific Research recognizes the importance of continuous evolution to not just keep pace with global trends but to surpass them. Our vision involves the creation of an educational system firmly rooted in the knowledge economy and a steadfast transition towards digitalization. We are actively working to introduce internationally updated and interdisciplinary programs that seamlessly integrate advanced sciences such as robotics, artificial intelligence, genomic medicine, self-transportation, digital economy, and knowledge work automation.

I would like to acknowledge the team who worked and contributed to this visionary initiative. Together, let us embark on this transformative journey, shaping a future where Egyptian higher education is a driving force in global innovation and economic development.

Mostafa Madbouly
Prime Minister of the Arab Republic of Egypt

FOREWORD BY MINISTER OF HIGHER EDUCATION & SCIENTIFIC RESEARCH

AYMAN ASHOUR

In the pursuit of sustainable development and the vision of Egypt, higher education stands as the driving force behind innovation, entrepreneurship, and economic growth. Today, I am honored to introduce the Egyptian Higher Education and Scientific Research Blueprint—a comprehensive strategy designed to elevate our education system to new levels and pave the way for sustainable development.

The blueprint recognizes the indispensable link between academia and industry. We envision a seamless integration that equips our graduates with practical skills, aligns education with market needs, and nurtures a generation of entrepreneurs ready to meet the challenges of the future.

In pursuit of this vision, we embrace seven guiding principles: integration, interdisciplinarity, connectivity, effective participation, sustainability, international reference, and innovation & entrepreneurship. These principles form the foundation of our roadmap. This roadmap is our collective vision to reimagine the future of higher education and research in Egypt, aspiring to position our nation as a global hub for a thriving knowledge-based economy.

Realizing this ambitious blueprint requires the collective commitment of universities, faculty, students, policymakers, and the private sector. I urge every Egyptian to embrace this transformative vision, for together, we have the power to shape an education system that not only transforms lives but propels Egypt to new levels of development.

As we conclude the planning phase of this strategy, it brings me great pleasure to share it with the Egyptian higher education and scientific research sector, as well as all relevant authorities and individuals with an interest in the advancement of higher education in the Arab Republic of Egypt. I extend my gratitude to everyone involved in shaping this strategy. I am confident that together, we will successfully attain the outlined objectives. I extend my best wishes for success to all our stakeholders, including academic institutions, researchers, and students, as well as for the continued progress, growth, and prosperity of our beloved country.

Ayman Ashour
Minister of Higher Education and Scientific Research

PREFACE

The Egyptian higher education system has experienced remarkable growth and progress in recent decades. In the past decade, it has achieved significant advancements, such as the expansion of public universities and the establishment of new branches for international institutions. Moreover, the system has placed greater emphasis on technology, enhancing the information infrastructure in public universities and implementing a wide scale electronic online test system. These efforts have resulted in increased global recognition in crucial areas like research publications, internationalization, innovation and entrepreneurship and institutional quality. These achievements reflect the commitment and innovative spirit of the Egyptian academic community.

However, the Ministry of Higher Education and Scientific Research (MOHESR) acknowledges the need for continuous evolution in order to keep pace with, and ideally surpass, global trends. The ministry's approach involves building an educational system grounded in the knowledge economy and a transition towards digitalization. Additionally, the ministry is actively working towards introducing internationally updated programs and even developing new disciplines that integrate well-established sciences such as advanced robotics, artificial intelligence, genomic medicine, self-transportation, digital economy, and automation of knowledge work. These transformative fields are expected to reshape the business and social landscape in profound ways, far beyond what we see today.

The ministry has developed the Egyptian Higher Education and Scientific Research Blueprint to act as a road map that highlights seven key principles to achieve these goals: integration, interdisciplinarity, connectivity, effective participation, sustainability, international reference, and innovation and entrepreneurship. This blueprint has been developed by Egyptians for Egyptians with the aim of reimagining the future of higher education and research in Egypt as a global hub for a thriving knowledge-based economy.

INTRODUCTION

The Egyptian Ministry of Higher Education and Scientific Research (MOHESR) believes that higher education and scientific research are the point of departure for changing the development trajectory of countries. Consequently, educational and research institutions are tasked with a key role to form and develop intellectual capital, which is the backbone of a knowledge-based economy.

It has become urgent for the MOHESR to launch a comprehensive and integrated vision of the higher education process and the educational and research institutions in Egypt to promote global ties in this sector and foster a vibrant Egyptian economy. This decision was made in the context of rising international education standards and with the aim of placing Egyptian educational and research institutions within the ranks of their global counterparts. Providing high quality and clear added value in the educational process will serve to increase the competitiveness of Egyptian education and attract university students and researchers from all over the world.

Our higher education strategy is derived from the goals of the sustainable development strategy (SDS). It is designed to support and complement efforts by provinces, territories, and stakeholders toward the collective goal of a sustainable and successful education sector through improving the quality of the educational process. This can be achieved by adopting international quality standards; the formation of university students and researchers capable of innovation and creativity; keeping pace with local and international labor markets; increasing opportunities to enroll in higher education across the country, including regions that suffer from a shortage of university students; and building a dynamic relationship between the educational process and the requirements of the labor market in a way that decreases unemployment and places graduates in workplaces that fit their qualifications and provide them with a conducive environment for innovation and creativity. On that basis, the higher education strategy aims to promote further debate about the path forward for universities. Moreover, it provides greater detail about the seven priority principles that will ensure we deliver the right service and support at the right time. It also reflects where we are uniquely placed to act.

Our strategy is based on three aspects as follows:
The first is the geographical distribution of development plans in trade, industry, agriculture, tourism, health, construction, communications, and information technology sectors over the seven main regions of Egypt.

The second is the link between the objectives of the MOHESR and its educational institutions and the goals of the sustainable development strategy 2030.

The third is the future of higher education and universities, and the vision of fourth generation (4G) institutions, in order to make Egyptian universities pioneers in the education industry and labor market and increase their influence on the field, instead of being just a partner responding to the needs of the industry. This also includes urging students, researchers, scientists, and professors to be involved effectively in innovation.

The seven priority principles provide the basis for this vision. They are the roadmap for the advancement of the higher education process in general and educational institutions specifically, as they are hugely supportive of the transformation of educational institutions into open spaces for innovation, attracting calibers and building strong ecosystems that underscore the stability of educational institutions. These principles also help in restructuring educational institutions and their affiliates from an administrative point of view, in a way that ensures consistency with the innovations of the educational system, sustainable development, and preservation of gains. Upon implementing these principles, higher education shall serve all investment sectors in a way that transforms the country from a consuming economy to a producing one and fills in the gaps in some regions, enhancing the concept of communication at the internal and external levels to assure knowledge exchange, strengthen cooperation, and build partnerships internally and internationally. Moreover, the educational system places significant value on investment support for education by enacting legislation that allows educational institutions to establish private companies whose purpose is to advance science, technology, and innovation and to exploit the outputs of scientific research in order to develop and serve the education system and society in general.

This document explains the vision and strategy of the Egyptian Ministry of Higher Education and Scientific Research. Each of the seven main principles are defined and identified in a separate chapter as follows:

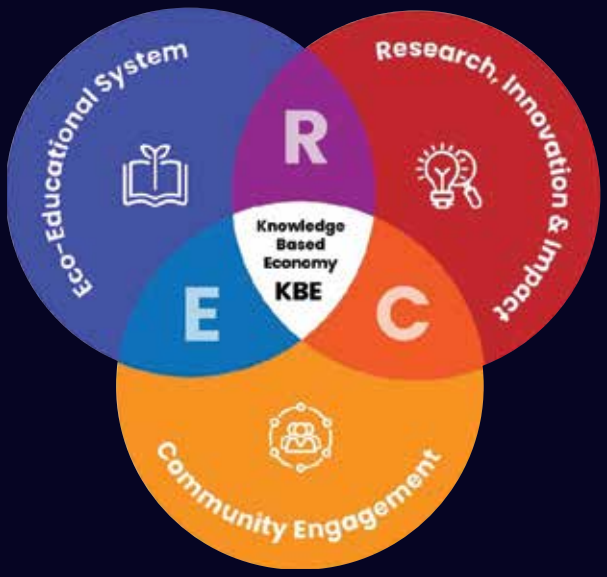
- Chapter 1: Integration
- Chapter 2: Interdisciplinarity
- Chapter 3: Connectivity
- Chapter 4: Effective Participation
- Chapter 5: Sustainability
- Chapter 6: International Reference
- Chapter 7: Innovation and Entrepreneurship

These principles are preceded by an overview of the current status of higher education and scientific research in terms of three main tracks which integrate to form the basis of a knowledge-based economy:

- Eco-education System
- Research, Innovation, and Impact
- Community Engagement

KNOWLEDGE-BASED ECONOMY

KBE



Arab Republic of Egypt

وزارة التعليم العالي والبحث العلمي

Ministry of Higher Education
& Scientific Research

I. CURRENT STATUS 2022 - 2023

Arab Republic of Egypt

وزارة التعليم العالي والبحث العلمي

Ministry of Higher Education
& Scientific Research

I.I HISTORY OF HIGHER EDUCATION IN EGYPT

I. CURRENT STATUS

I.I.I EGYPT & ITS ANCIENT CIVILIZATION

Egypt, today the Arab Republic of Egypt, is a country that connects northeast Africa and northwest Asia via the Sinai Peninsula. It is surrounded by the Mediterranean Sea, Gaza Strip, Red Sea, Sudan, and Libya. It has a total land area of 1,001,450 km^2 making it one of the largest countries in Africa and the 30th largest in the world. At approximately 100 million, Egypt's population ranks fourteenth in the world with 43% of its people live in cities. Cairo is the capital of Egypt and one of the largest metropolitan areas in Africa, the Middle East, the Arab World (World Data, 2023).

Between the 6th and the 4th millennium BC., permanent settlements rose gradually along the Nile River. This is seen as a starting point for civilization and helped early developments in writing, farming religion, and governance. The enduring monuments continue to bear witness to the remarkable proficiency of the ancient Egyptians in writing and literature.

When the Rosetta Stone was discovered, the ancient Egyptians were credited for inventing writing. Termed the "hieroglyphic alphabet," their writing system consisted of 24 letters. Ancient Egypt's contributions include pioneering mummification, medicine, agriculture, engineering, and architecture, making it a significant influence for over 7,000 years. The Egyptian civilization also emphasized the importance of writing and formal education.

I.I.II EDUCATION IN ANCIENT EGYPT

Ancient Egyptian education, resembling modern systems in both style and curriculum, focused on preparing individuals for specific professions, particularly as scribes and craftsmen. Classroom depictions show children seated at desks, being instructed by a teacher. The primary goal was to train people for roles in local and national institutions such as palaces and temples.

The ancient 'Oan University,' is arguably one of the oldest universities in history and primarily concentrated on preparing scribes and officials for bureaucratic roles. Education in ancient Egypt, spanning approximately 30 centuries, contributed to the careers of notable figures like Amenhotep and Akhenaten.

I.I.III EDUCATION IN THE ISLAMIC ERA IN EGYPT

The 7th to the 10th centuries witnessed the flourishing of Islamic education in Egypt, with the establishment of primary Islamic schools known as kuttabs. These institutions were often associated with mosques and later evolved into institutional-based models. Islamic education evolved into a dual system combining public education with Islamic studies, notably represented by al-Azhar. Al-Azhar was established in Cairo, Egypt in AD 970 and holds the dual distinction of being Egypt's oldest university to grant degrees and the world's most effective global institution of Islamic learning and scholarship.

Higher Islamic education in Egypt has gone through various phases of intellectual development. In the 12th century, after the end of the Fatimid dynasty, Salah al-Din al-Ayyubi converted al-Azhar to a Shafi'i Sunni center of learning. Under the Mamluks, al-Azhar was revived as a center for systematic education housed in a separate institution within the mosque compound, with its own classrooms, dormitories, and library. The Mamluks provided salaries for instructors and allowances for the students while giving the institution endowments. Consequently, al-Azhar attracted many scholars from different parts of the world, establishing itself as a prominent international center for learning.

I.I.IV EDUCATION IN MODERN EGYPT

Modern education was introduced under the rule of Ottoman Pasha Muhammad Ali in the early 1800s. Egypt witnessed significant transformations in governance and the economy during this period, and Muhammad Ali is recognized as an innovator and the founder of modern Egypt. He focused on embracing Western culture and turning the nation into a modern state. Recognizing the importance of education and science, he established specialized schools, sent academic missions abroad, and facilitated the translation of foreign books into Turkish and Arabic. He aimed to build a modern state with a competent military, emphasizing the role of science and experience. His vision encompassed the development of engineers, doctors, teachers, translators, and various experts. Thanks to these initiatives, Egypt had a new generation capable of building a modern Egypt.

Toward the end of the 19th century, within a reform movement, efforts emerged to find an alternative to al-Azhar's religious education. This initiative was integrated with the Egyptian nationalist movement that gained momentum in the early 20th century. Influential figures advocated for the establishment of an Egyptian university. The Egyptian University was officially founded in 1908, and it served as the foundation for a comprehensive academic revival in all fields to keep pace with international scientific and academic progress. As a private institution, the Egyptian University initially focused on liberal arts, offering courses in economics, philosophy, history, and literature, primarily taught by European professors of oriental studies. It soon became a public university and was named Cairo University in 1954. Its foundation was followed by the establishment of other universities such as the American University in Cairo and Alexandria University, highlighting a rising need for a governing system to empower and guide the growth of higher education institutions in Egypt.

Arab Republic of Egypt

وزارة التعليم العالي والبحث العلمي

Ministry of Higher Education
& Scientific Research

I.II
OVERVIEW OF THE MINISTRY OF HIGHER EDUCATION AND SCIENTIFIC RESEARCH (MOHESR) IN EGYPT

I. CURRENT STATUS

I.II.I THE ESTABLISHMENT AND INSTITUTIONS

The Ministry of Higher Education and Scientific Research is one of the governmental ministries of Egypt and part of the cabinet. It was formed in 1961 when Higher Education (HE) became free in Egypt. The major function of the ministry, based in Cairo, is to introduce, develop and monitor all higher education-related policies. The ministry is responsible for educational activity in Egyptian universities, public, private, national, technological, and higher institutes. In addition, the ministry supervises the Academy of the Arabic Language and the National Committee of UNESCO. The ministry has international bureaus, including the Egyptian Cultural and Educational Bureau in Washington, D.C. The ministry monitors 28 public universities, 27 private universities, 20 national universities, 10 technological universities, 7 branches of international universities, and more than 164 higher institutes, as well as scientific research in universities or scientific research institutes. It also supervises all career centers and university hospitals across the country as well as several international organizations and cultural and educational bureaus or centers in Washington, Rome, Greece, Paris, Berlin and Spain.

I.II.II THE MINISTRY'S ROLE IN DEVELOPMENT

In the era of globalization, where the world has become almost like a small village, competition prevails, and for countries such as Egypt to be able to compete, they must pursue development. Many methods, approaches, plans, and models have been suggested and implemented, yet there have been only a few successful examples. One tool that could help underdeveloped countries take a successful development path is higher education. In Egypt, higher education is believed to be instrumental in preparing human capital to play a major role in achieving development goals and sustainable progress. Recent research has discussed the importance of human capital as a factor in realizing a successful model for development. The Ministry of Higher Education and Scientific Research contributes to the process of development by producing a generation of highly educated graduates in different disciplines and by providing scientific research facilities for further development.

Egypt has produced many prominent and dedicated scientists, educated at Egyptian educational institutions, who have created a formidable legacy of accomplishments for humanity and who have left a prominent mark on various aspects of innovation, science, and technology.

- **Ahmed Zewail (1946-2016):** Known as the 'Father of Femtochemistry', Ahmed Hassan Zewail became the first Egyptian to win a Nobel Prize in a scientific field in 1999. He graduated from Alexandria University.
- **Ali Moustafa Mosharafa (1898-1950):** An Egyptian theoretical physicist, Ali Moustafa Mosharafa was a professor of applied mathematics at the Faculty of Science at Cairo University and served as its first dean. He contributed to the development of quantum theory as well as to the theory of relativity.
- **Farouk El-Baz (1938-Present):** An Egyptian American space scientist and geologist, Farouk El-Baz is known for his collaboration with NASA in the scientific investigation of the moon and contributions to the planning of the Apollo program. He earned his degree from Ain Shams University.
- **Sir Magdi Habib Yacoub (1935-Present):** An Egyptian retired professor of cardiothoracic surgery at Imperial College London, Sir Magdi Yacoub pioneered heart valve repair techniques and made significant contributions to heart transplant technology. He graduated from Cairo University.

And the list goes on… Egyptian scientists have been contributing hugely to different sciences over the years since the ancient Egyptians.

The significance of the ministry's contribution extends to bridging the gap between academia and industry. This is essential for creating an ecosystem that boosts economic development and positions the nation for global competition. Thus, the ministry ensures that educational programs are in line with job markets. Moreover, the ministry supervises the career centers that help in career development and connect graduates and educational programs with market needs.




I.II.III HIGHER EDUCATION ADMINISTRATIVE STRUCTURE

The Egyptian Ministry of Higher Education and Scientific Research, with the help of eight supreme councils under its supervision—Supreme Council of Universities, Supreme Council of Private Universities, Supreme Council of Technical Institutes, Supreme Council of Foreign Universities, Supreme Council of National Universities, Supreme Council of Higher Institutes, Supreme Council of Technical Institutes, Supreme Council of Hospitals, and Supreme Council of Scientific Research—is responsible for setting the policies, monitoring implementation, and supervising all tertiary education. It is the main regulatory body for higher education in Egypt. These councils are responsible for making sure that the degrees offered by different universities and institutes are consistent and in harmony. Among these councils, the Supreme Council of Universities is the highest body that governs public universities. It sets the general policy for higher education in Egypt and links it to the needs of the country. It also implements a general coordination policy for universities regarding attendance, the academic year, and examinations. Furthermore, it coordinates between equivalent faculties and departments at different universities, sets frameworks for internal by-laws of the universities and their faculties, and approves them.

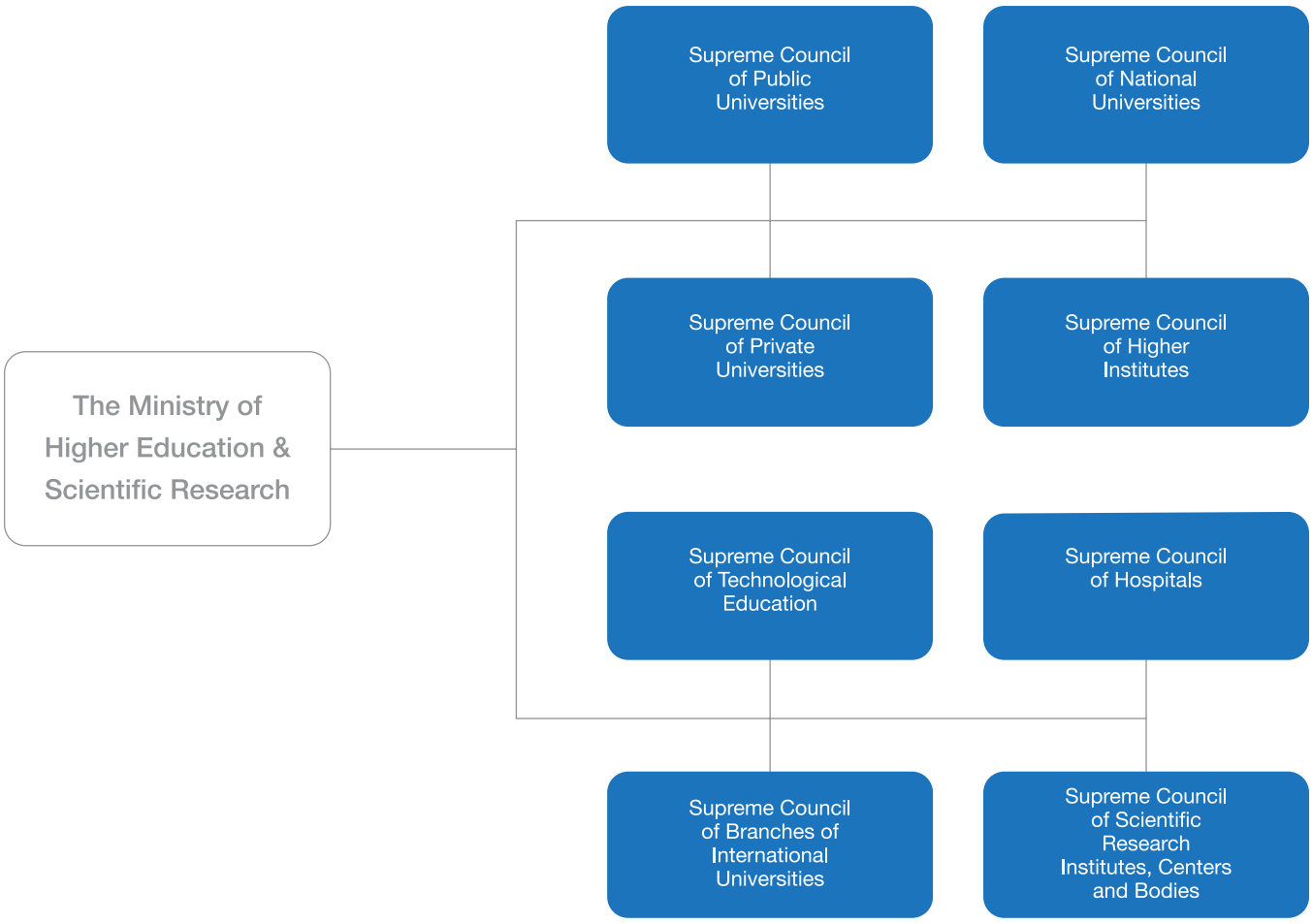


FIGURE (I - 1) : ADMINISTRATIVE STRUCTURE OF HIGHER EDUCATION IN EGYPT

I.II.IV HIGHER EDUCATION AND SCIENTIFIC RESEARCH SYSTEM TRACKS

The current status of the Egyptian higher education and scientific research system can be described via three main tracks: the eco-education system; research, innovation and impact; and community engagement.

Each track serves distinct purposes and plays a crucial role in the overall development of both individuals and society as a whole.

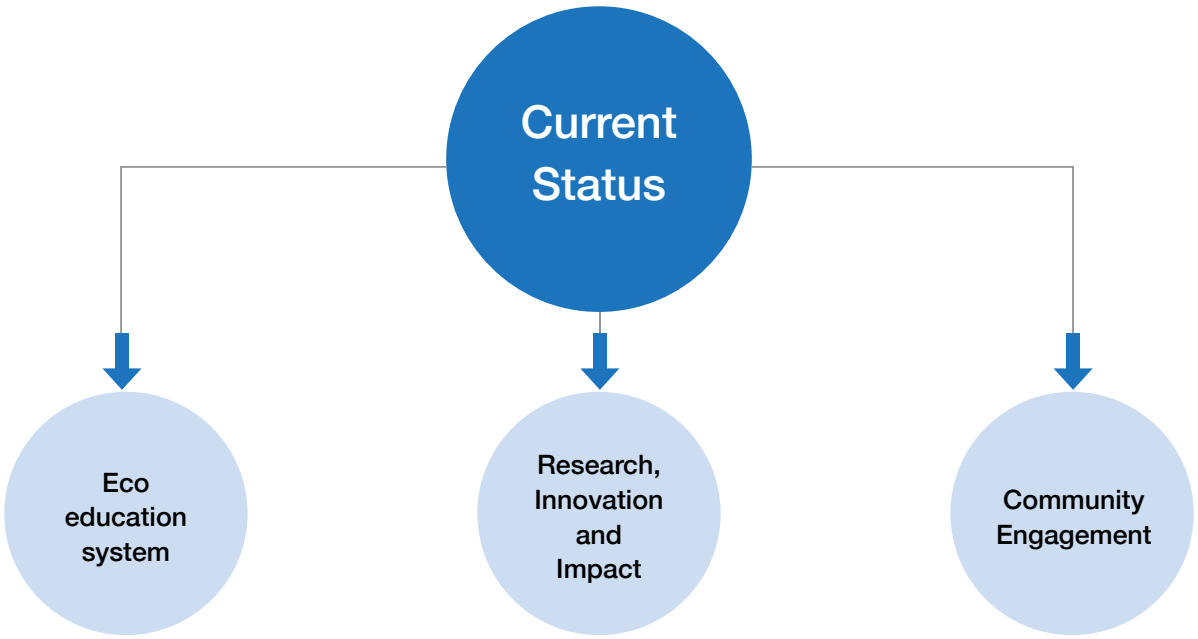


FIGURE (I - 2) : THE EGYPTIAN HIGHER EDUCATION AND SCIENTIFIC RESEARCH SYSTEM TRACKS – CURRENT STATUS

The Eco-education System: This track includes all types of universities and higher institutes. It illustrates the status of the built environment across Egypt's regions that provide formal education and academic degrees across various disciplines in addition to the digital transformation plan for better quality education. Human resources play a vital role within this track, including international students and staff members.

Research, Innovation, and Impact: This track is dedicated to advancing knowledge and contributing to the global body of scientific understanding. Universities and research institutions along with the supporting authorities like the Science, Technology & Innovation Funding Authority (STDF) and the Academy of Scientific Research and Technology (ASRT), Innovators Supporting Fund (ISF), play a crucial role in this track by providing resources, infrastructure, and opportunities for researchers to pursue their investigations.

Community Engagement: This track covers a wide range of topics such as innovation, entrepreneurship, and career development. It highlights the services that help in turning knowledge and research outcomes into practical applications, promoting innovation, and fostering economic growth. It encompasses all the resources that are necessary for creating vibrant entrepreneurial ecosystems that support individuals and startups. It also includes providing valuable services to society, such as university hospitals that offer healthcare services, thereby contributing to economic development and societal well-being.

Arab Republic of Egypt

وزارة التعليم العالي والبحث العلمي

Ministry of Higher Education
& Scientific Research

I.III
THE ECO-EDUCATION TRACK

I. CURRENT STATUS

I.III.I UNIVERSITIES AND HIGHER INSTITUTIONS

The Status of Institutions in 2014

In 2014, there were four main paths for enrolling students in higher education:

- **Public universities:** A public university or public college is a university or college that is under state ownership or receives significant public funds through a national or sub-national government. There are public universities in all regions across Egypt such as Cairo University, Ain Shams University, Alexandria University, Assiut University, etc.

- **Private universities:** They are independent institutions of higher education that are not operated, owned, or institutionally funded by governments. While they maintain financial autonomy, private universities may still receive certain forms of government support, such as tax breaks, public student loans, and grants. The extent of government regulation on private universities may vary depending on their location. In some cases, government regulations and oversight may be imposed. Many private universities are nonprofit organizations. Egypt has many private universities, including the American University in Cairo, the German University, the British University in Egypt, etc.

- **National universities:** A national university is mainly a university created or managed by a government, but which may also at the same time operate autonomously without direct control by the state. Some national universities are associated with national cultural or political aspirations. Egypt has some national universities, including Nile University, French University, Egypt Informatics, etc.

- **Higher institutes and private institutes:** They are specialized institutions that offer focused and specialized education in specific fields of study. These institutes typically provide diploma or advanced diploma programs, offering practical training and specialized skills in areas such as technology, engineering, and applied arts and more.

These 4 education paths were available in different regions across Egypt. In 2014, there were 24 public universities with 392 faculties and 118 new programs across the regions and 23 private universities that offered 132 faculties across Egypt as well as 3 national universities with 9 faculties in the Greater Cairo Region and 164 higher institutes and private institutes all over Egypt.

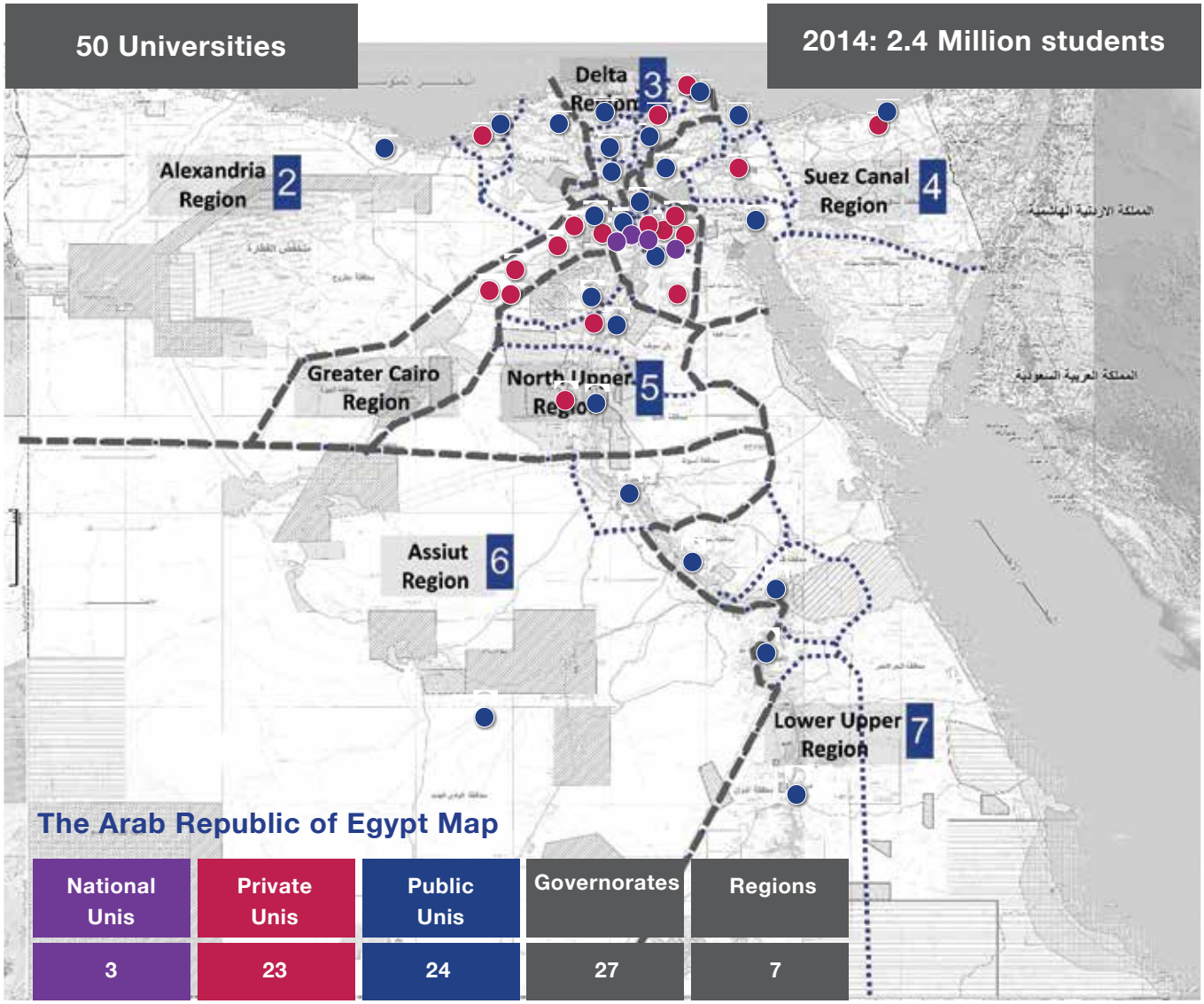


FIGURE (I - 3) : HIGHER EDUCATION INSTITUTIONS IN 2014

Each path has its own educational method providing a possible diversity to the enrollment process but requiring additional links to market needs. At the highlighted time, the total number of enrolled students was 2.4 million students where 82.9% of students were in public universities.

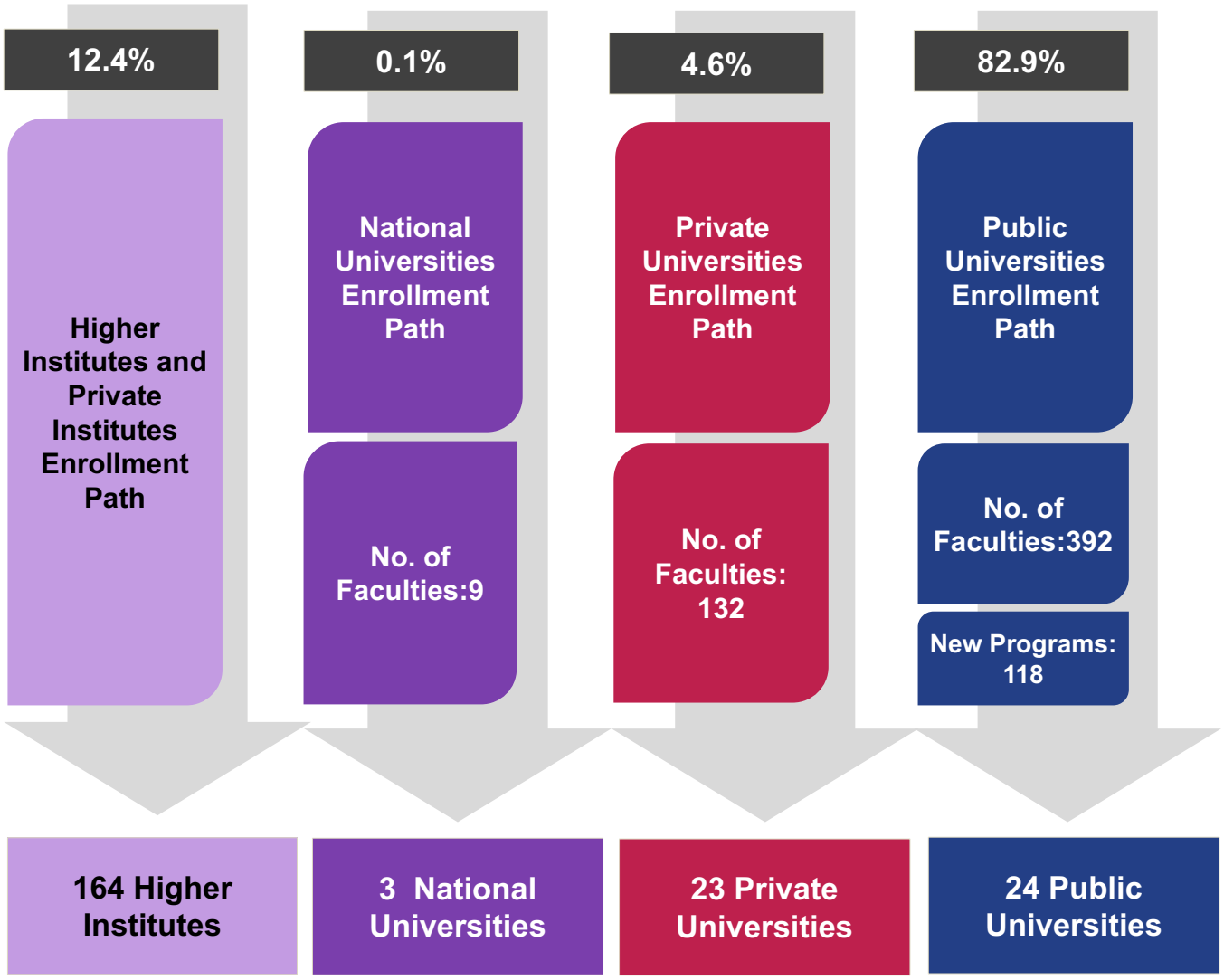


FIGURE (I - 4) : HIGHER EDUCATION PATHS IN 2014

THE CURRENT STATUS OF INSTITUTIONS IN 2023

In 2023, the Eco-education Track was expanded to encompass eight paths for enrolling students. They can join one of 27 public universities, 28 private universities, 4 national universities (type 1), 4 national universities (type 2 - international universities), 12 national universities (type 3 – derived from public universities), 10 technological universities, 7 branches of foreign universities, or 176 higher institutes and private institutes. Each path has its own educational method which creates diversity in the enrollment process. However, in all cases, additional links to market needs are necessary. At present, there are 3.3 million students enrolled in Higher Education Institutions (HEIs) with percentages as follows: 68.1% at public universities; 9% at private universities; 1% at national universities (type 1), 2.2% at national universities (type 2 – international universities); 2.2% at national universities (type 3 – derived from public universities); 2% at technological universities; 0.7% at branches of foreign universities; and 16.2% at higher institutes.

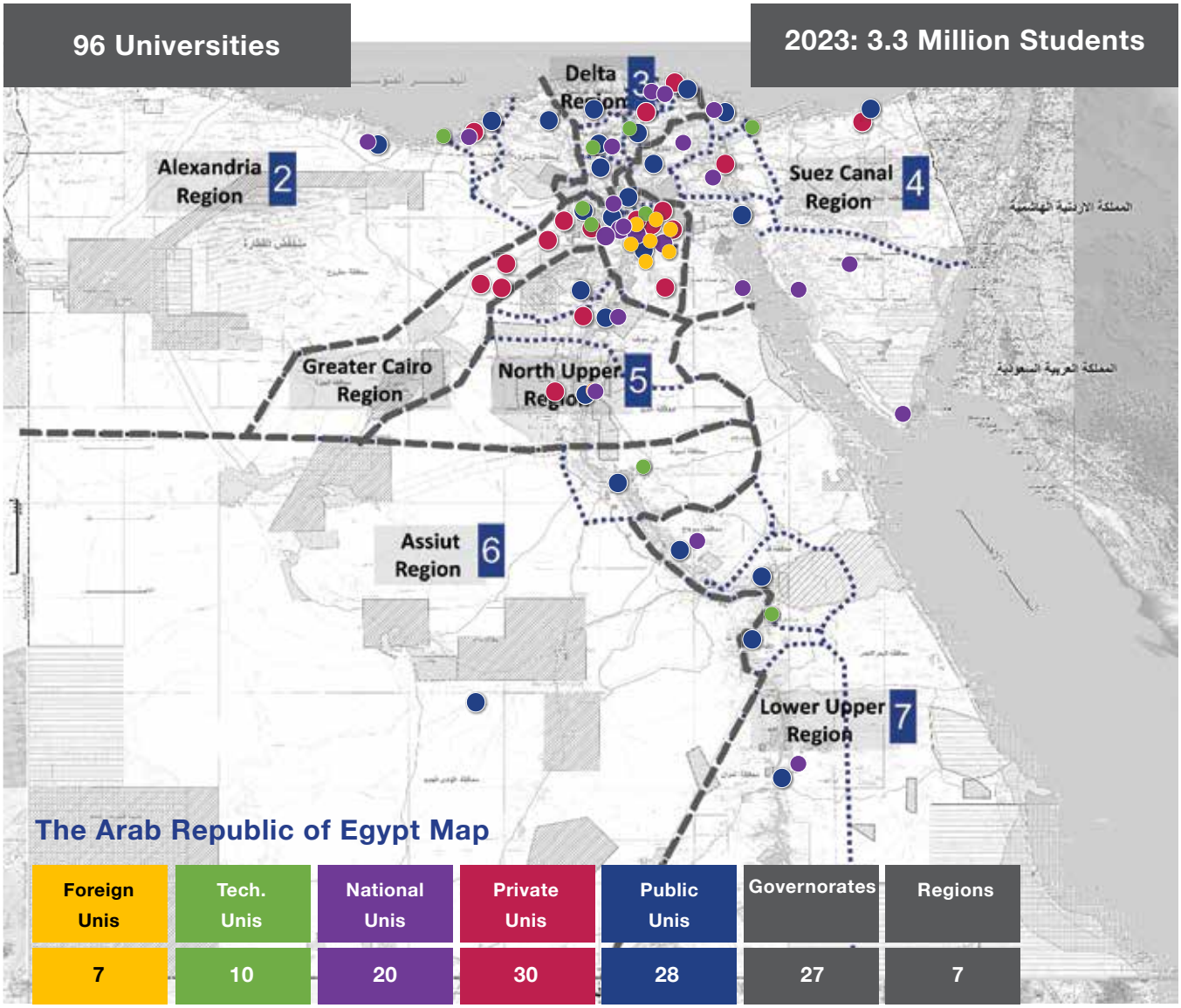


FIGURE (I - 5) : ALL EDUCATION INSTITUTIONS – CURRENT STATUS 2023

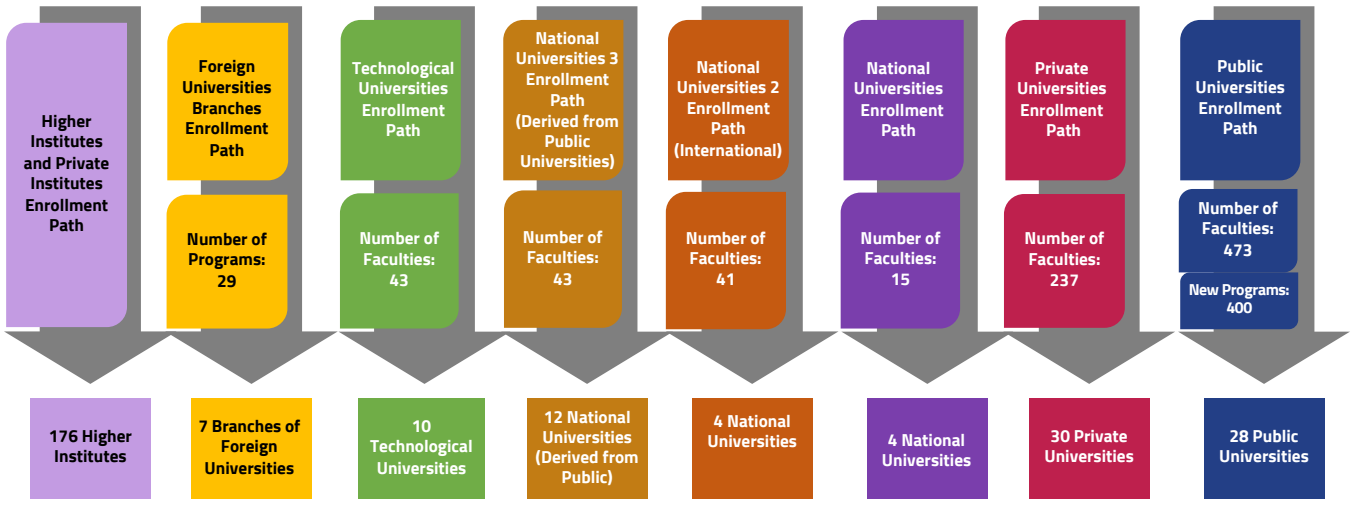


FIGURE (I - 6) : EDUCATION PATH 2023

PUBLIC UNIVERSITIES

AIN SHAMS ALEXANDRIA CAIRO SUEZ UNIVERSITIES				
SADAT CITY HELWAN MATROUH KAFR EL SHEIKH UNIVERSITIES				
SUEZ CANAL BENI SUEF FAYOUM MENYA UNIVERSITIES				
ZAGAZIG MANSOURA TANTA ARISH UNIVERSITIES				
MENOUFEYA BENHA DAMIETTA DAMANHOUR UNIVERSITIES				
NEW VALLEY ASSIUT HURGHADA PORTSAID UNIVERSITIES				
LUXOR ASWAN SUHAG SOUTH VALLEY UNIVERSITIES				

FIGURE (I - 7) : EXAMPLES OF PUBLIC UNIVERSITIES ACROSS REGIONS OF EGYPT

PRIVATE UNIVERSITIES

The number of private universities has increased to 30 universities offering 237 faculties. 16 universities are in the Cario region alone, and the others are spread out across the other regions. Approximately 9% of students choose this path.

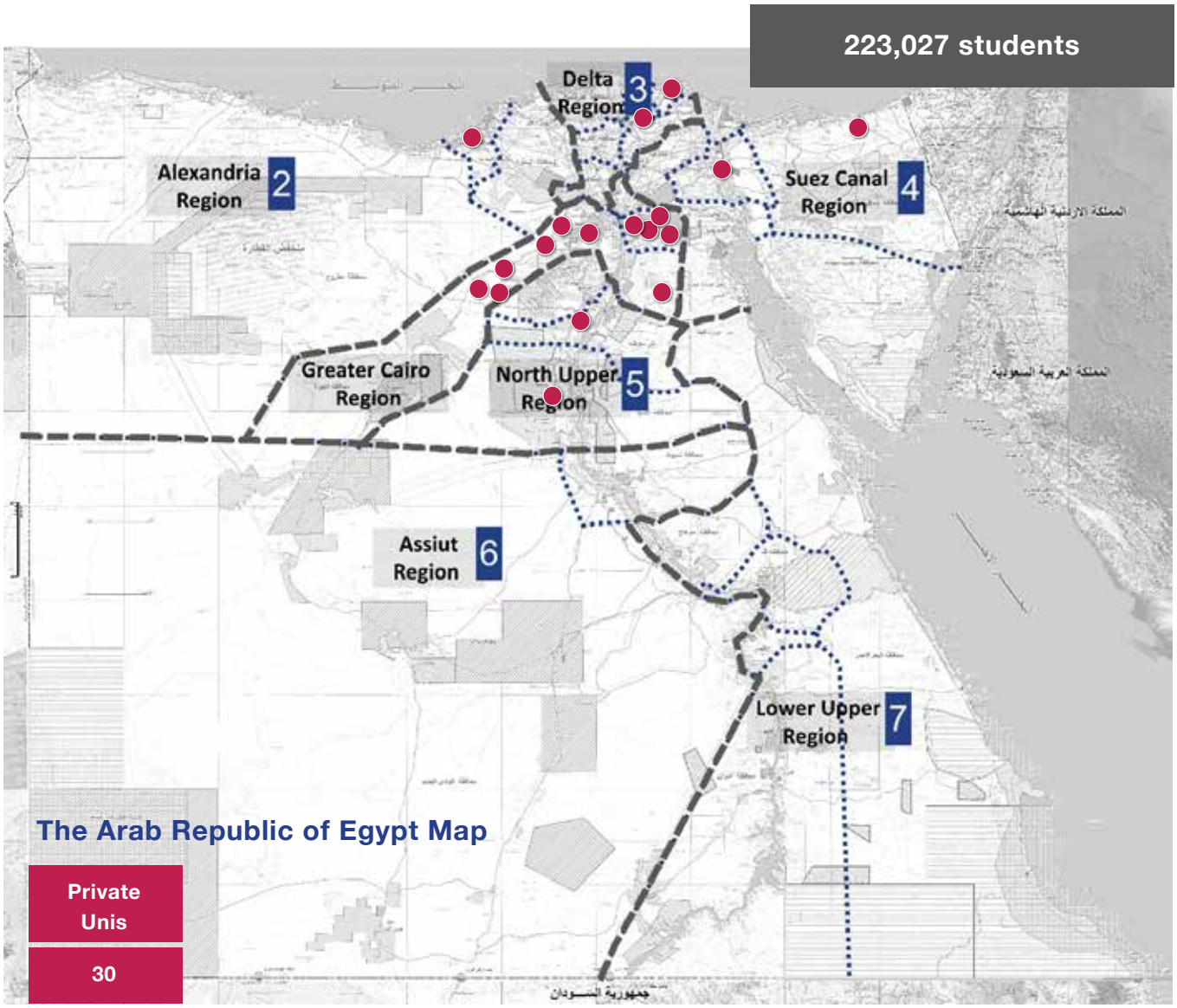


FIGURE (I - 8) : PRIVATE UNIVERSITIES ACROSS REGIONS OF EGYPT

FIGURE (I - 9) : EXAMPLES OF PRIVATE UNIVERSITIES ACROSS REGIONS OF EGYPT

NATIONAL UNIVERSITIES

In addition to public and private universities, the establishment of national universities has become a focal point for the government of Egypt. National universities are primarily universities created or managed by the government, while also operating autonomously without direct state control. These universities play an

important role in shaping the country's identity and progress.

Over the years, there has been a significant increase in the number of national universities in Egypt. The number has grown from three in 2014 to a remarkable total of twenty in 2023 with 38,937 enrolled students. These national universities are categorized into three distinct types, each serving specific purposes and addressing unique educational needs within the country.

1. **National Universities Type 1**
   This type of national universities includes 4 universities: Nile University, the French University, The Egyptian Learning University, and Egypt University of Informatics, These universities offer 15 different faculties.

2. **National Universities Type 2 (International)**
   These are national universities that are also international which provide 41 different faculties with international recognition. Egypt has 4 national universities Type 2, including King Salman University with three branches, New Mansoura University, New Alamein University, and Galala University.

3. **National Universities Type 3 (Derived from public universities)**
   These national universities are distinguished by being derived from public universities. They provide 43 different faculties with international recognition. Twelve national universities Type 3 have been established including Mansoura National University, New Ismailia University, etc.

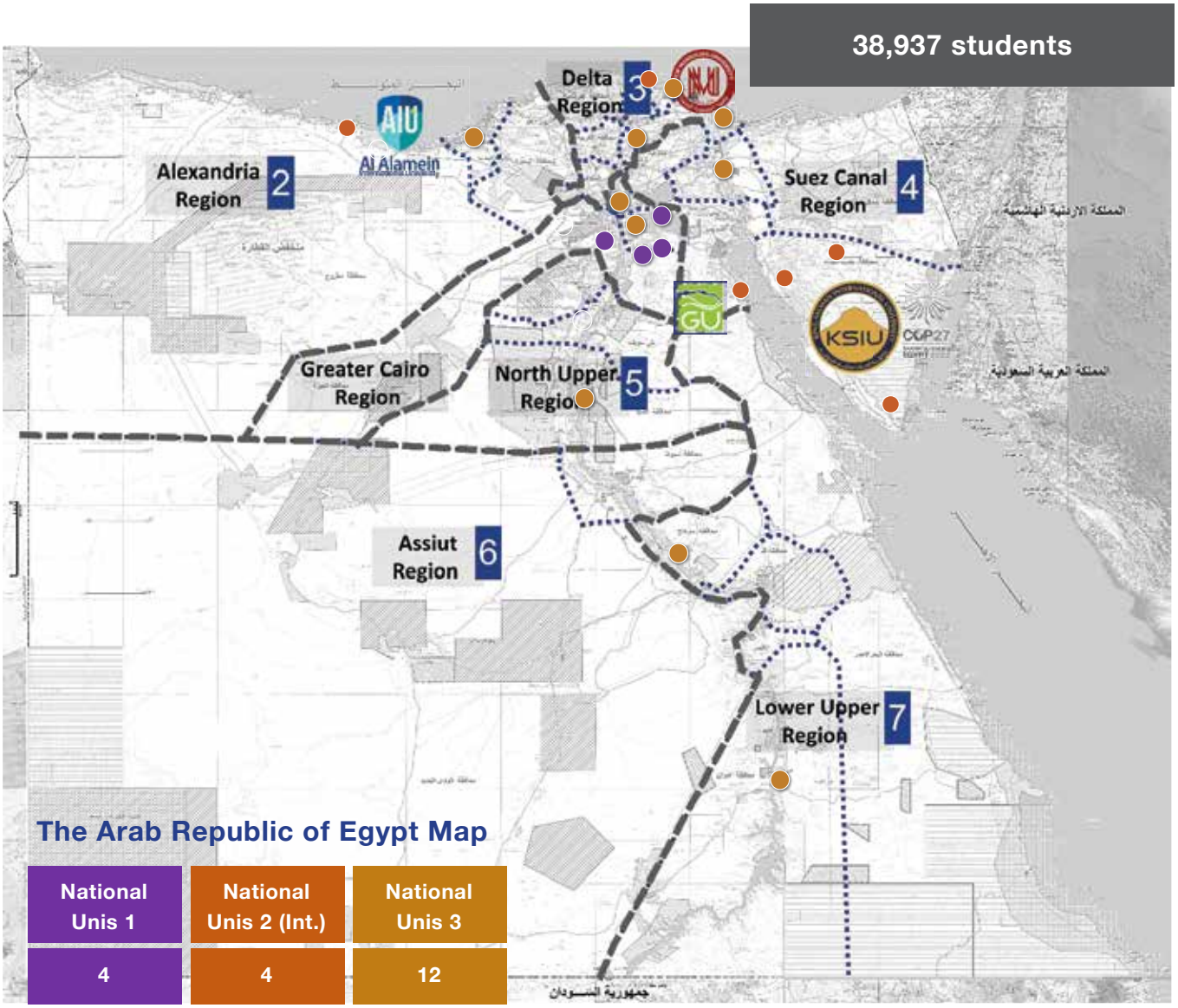
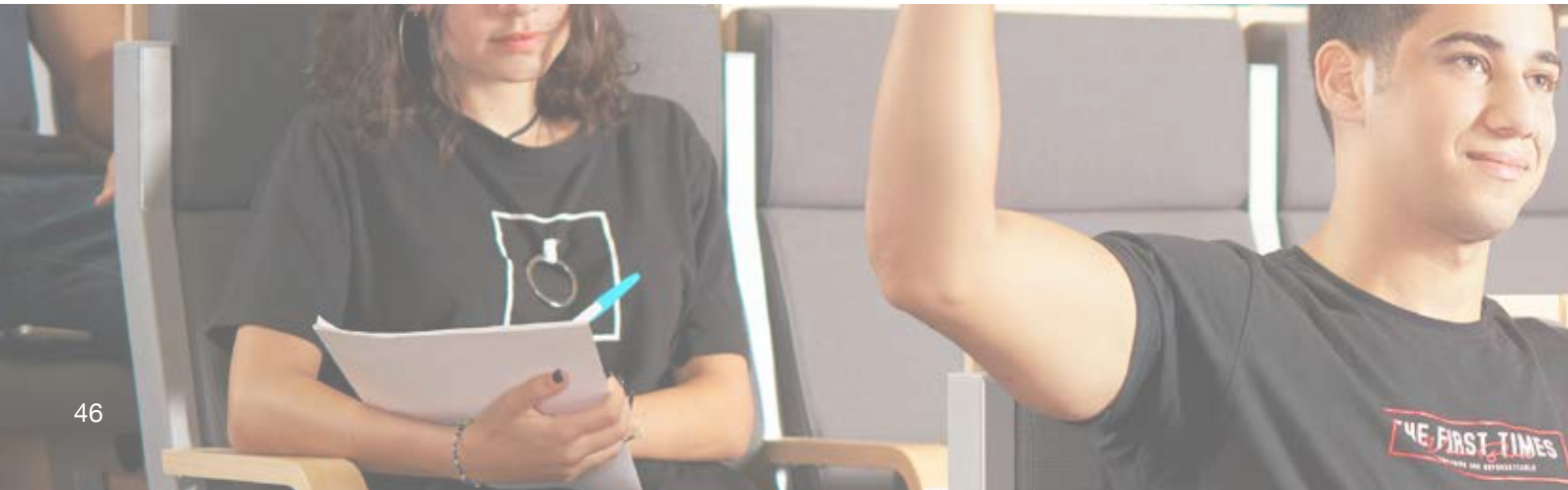


FIGURE (I - 10) : NATIONAL UNIVERSITIES ACROSS REGIONS OF EGYPT

NILE UNIVERSITY	
FRENCH UNIVERSITY OF EGYPT	
THE EGYPTIAN LEARNING UNIVERSITY	
EGYPT UNIVERSITY OF INFORMATICS	

FIGURE (I - 11) : EXAMPLES OF NATIONAL UNIVERSITIES TYPE 1



NEW MANSOURA UNIVERSITY		
KING SALMAN UNIVERSITY 3 BRANCHES		
GALALA UNIVERSITY		
NEW ALAMEIN UNIVERSITY		

FIGURE (I - 12) : EXAMPLES OF NATIONAL UNIVERSITIES TYPE 2

MANSOURA NATIONAL UNIVERSITY		NEW ISMAILIA UNIVERSITY	
HELWAN NATIONAL UNIVERSITY		SOUTH VALLEY NATIONAL UNIVERSITY	
FAST PORT SAID NATIONAL UNIVERSITY		MONOFIYA NATIONAL UNIVERSITY	
BENHA NATIONAL UNIVERSITY		ZAGAZIG NATIONAL UNIVERSITY	
BENI SUEF NATIONAL UNIVERSITY		ASSIUT NATIONAL UNIVERSITY	
MENYA NATIONAL UNIVERSITY		ALEXANDRIA NATIONAL UNIVERSITY	

FIGURE (I - 13) : EXAMPLES OF NATIONAL UNIVERSITIES TYPE 3

TECHNOLOGICAL UNIVERSITIES

Technological universities have been recently introduced in the educational track. These are institutions of tertiary education (such as universities or colleges) that specialize in engineering, technology, applied science, and natural sciences. Egypt now has 10 technological universities:

- New Cairo Technological University in the Greater Cairo Region.
- 6th of October Technological University in the Greater Cairo Region.
- Misr International University in the Greater Cairo Region.
- Burj AlArab Technological University in the Alexandria Region.
- Delta Technological University in the Delta Region.
- Samanoud Technological University in the Delta Region.
- East Port Said Technological University in the Suez Canal Region.
- Beni Suef Technological University in the North Upper Egypt Region.
- New Assiut Technological Region in the Assiut Region.
- New Thebes Technological University in the South Upper Egypt Region.

FIGURE (I - 14) : EXAMPLES OF TECHNOLOGICAL UNIVERSITIES

BRANCHES OF FOREIGN UNIVERSITIES

These are branches of international universities, not operated, owned, or institutionally funded by governments. They may (and often do) receive from governments tax breaks, public student loans, and grants. Depending on their location, these universities may be subject to government regulation. Egypt has 7 branches of foreign universities through four foundations including the Canadian Universities Foundation in Egypt, the International Knowledge Universities Foundation, Global Foundation, and European Universities in Egypt Foundation. 4905 students are currently enrolled in these universities. They offer 29 different programs.

The 7 branches of foreign universities are located in the New Administrative Capital in Cairo region:

Canadian Universities Foundation in Egypt
- Branch of the University of Prince Edward Island
- Branch of Ryerson University

Knowledge Hub Universities International Foundation
- Branch of Coventry University

Global Foundation
- Branch of the University of Hertfordshire

European Universities in Egypt Foundation:
- Branch of the University of London
- Branch of the University of Central Lancashire
- NOVA Lisbon University Campus in Cairo

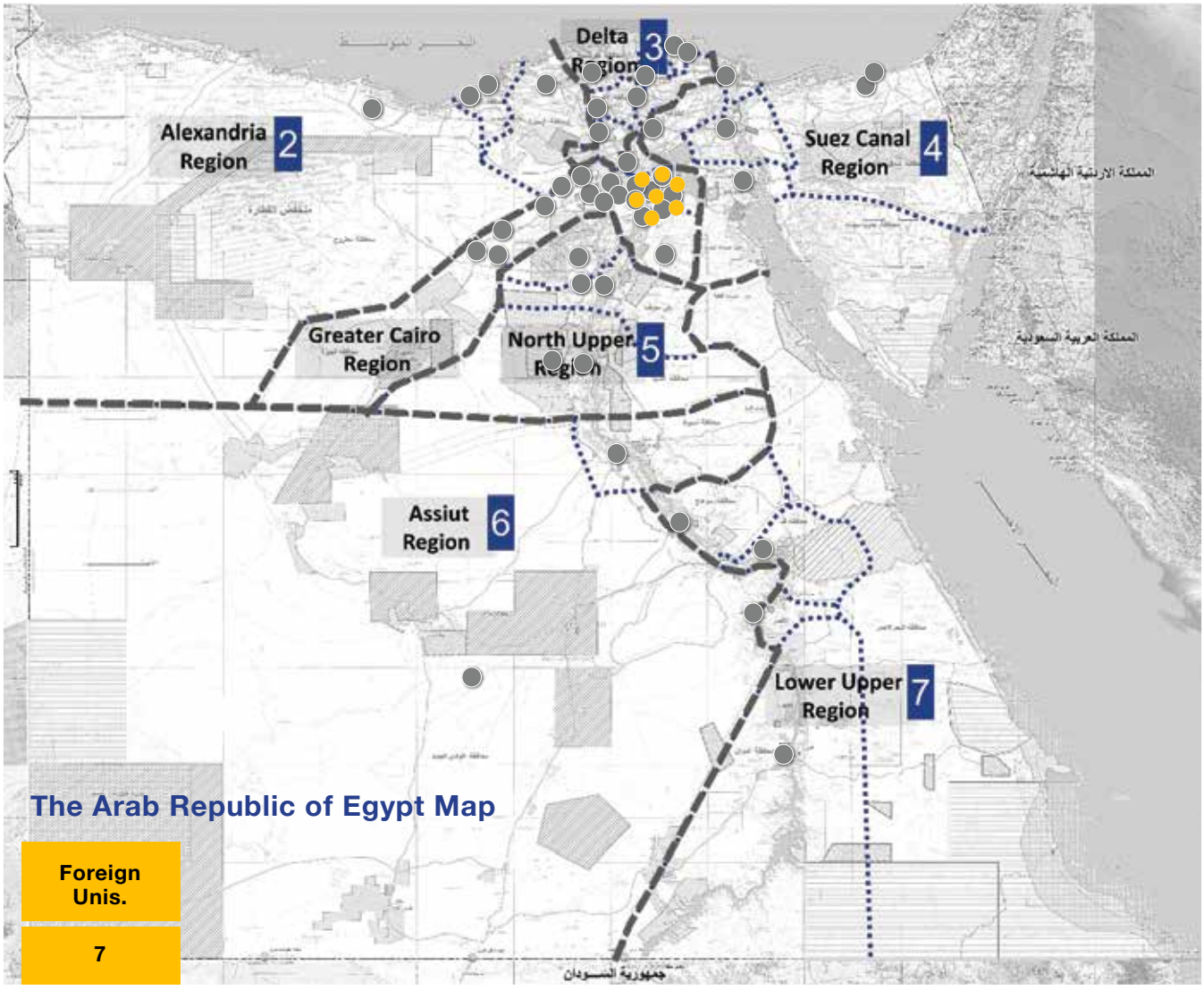


FIGURE (I - 15) : BRANCHES OF FOREIGN UNIVERSITIES ACROSS REGIONS OF EGYPT

CANADIAN UNIVERSITY AT NEW ADMINISTRATIVE CAPITAL		
UNIVERSITY OF HERTFORDSHIRE AT NEW ADMINISTRATIVE CAPITAL		
COVENTRY UNIVERSITY BRANCH AT NEW ADMINISTRATIVE CAPITAL		

FIGURE (I - 16) : EXAMPLES OF BRANCHES OF FOREIGN UNIVERSITIES

RATIONALE BEHIND ESTABLISHING NATIONAL UNIVERSITIES AND BRANCHES OF FOREIGN UNIVERSITIES

The establishment of national universities is driven by several factors, including:

- Filling the financing gap to support public education: National universities are created to address the financial challenges faced by public education institutions, ensuring adequate resources are available to support quality education.
- Availability of qualified faculty members in public universities: The establishment of national universities helps address the issue of limited faculty resources in public universities by attracting and retaining qualified educators.
- Community trust in Public Higher Education Institutions: National universities build upon the existing trust and credibility of public higher education institutions, ensuring the community has confidence in the quality and value of education provided.
- Lack of capacity to accommodate the expansion of premium programs without affecting the basic programs: National universities create additional capacity to accommodate the expansion of specialized and premium programs without compromising the availability of basic programs.

- Contributing to the development of new cities: By establishing national universities in new cities, these institutions become focal points for attracting investment, development, and talent, thereby contributing to the growth and progress of these cities.
- Giving support to deserving individuals: National universities provide opportunities for talented and capable individuals who deserve access to higher education, enabling them to pursue their academic aspirations.
- Benefitting from the equipment available in Public Universities: National universities can utilize the existing infrastructure, resources, and facilities available in public universities, such as laboratories and hospitals, to enhance the educational experience and support their programs.
- Expanding interdisciplinary programs: National universities play a crucial role in expanding interdisciplinary programs that align with the development sectors outlined in Egypt's Vision 2030, fostering innovation and addressing the country's evolving needs.

FIGURE (I - 17) : WHY NATIONAL UNIVERSITIES?

In addition, the establishment of branches of foreign universities in Egypt brings numerous advantages, including strengthening academic ties, providing global education opportunities locally, promoting diversity and competitiveness, reducing scholarship expenses, attracting international students, and enriching collaboration with state and community institutions. By establishing branches of foreign universities, Egypt aims to enhance collaboration and cooperation between its higher education system and renowned institutions in developed countries. This facilitates the exchange of knowledge, research, and best practices, ultimately elevating the quality of education in Egypt.

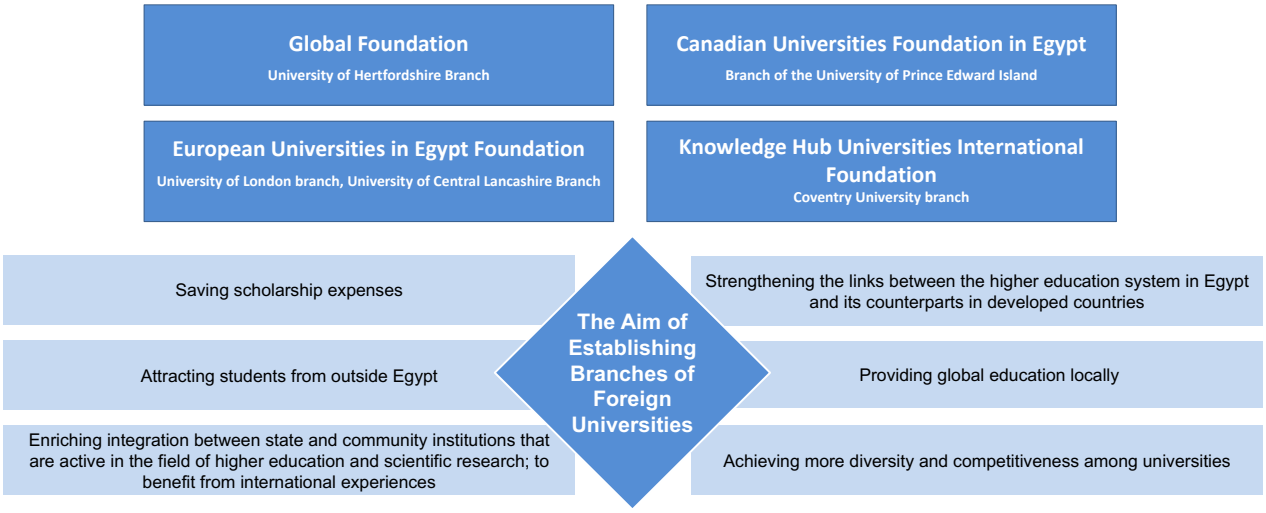


FIGURE (I - 18) : WHY BRANCHES OF FOREIGN UNIVERSITIES?

I.III.II DIGITAL TRANSFORMATION

Digital transformation is another important aspect of this track. A digital transformation plan was designed and implemented to form a digital hub to ensure the connectivity of Egypt's higher education system using the latest technologies. This includes Electronic/ Online Exams, Systems and Applications, Digital Infrastructure, Smart University/Campus, Digital Content, and Platforms/ Portals.

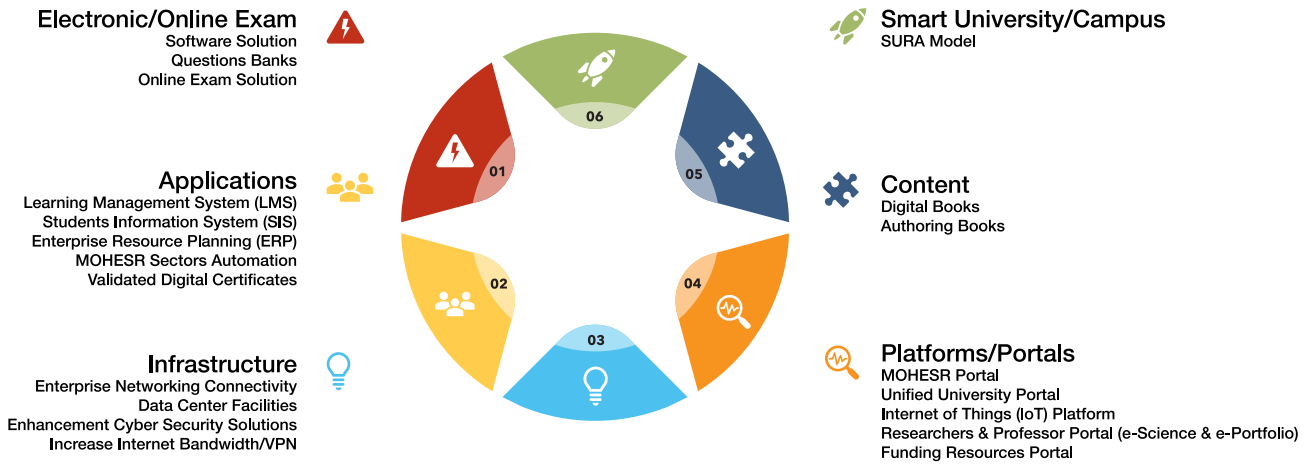


FIGURE (I - 19) : EGYPT'S HIGHER EDUCATION DIGITAL TRANSFORMATION HUB

1. Electronic/Online Exams

The Electronic/Online Exam Project is a significant initiative that leverages software solutions, question banks, and online exam platforms to modernize and enhance the examination process in universities. It aims to improve the accuracy, security, and efficiency of assessments while providing students with a seamless and convenient examination experience. The initiative comprises several components:

- Software solutions: This refers to the development and deployment of software applications specifically designed for conducting electronic or online exams.
- Question banks: It is the creation and maintenance of revised and certified question banks, which are databases of various exam questions across different subjects and topics.
- Online exam solutions: This allows students to take exams remotely or within designated examination

centers using computers or other electronic devices.
- Health sector colleges (Phase I): In the first phase of the project, the focus is on implementing the electronic/online exam system in faculties related to the health sector (84 faculty).
- Rest of the faculties (Phase II): In the second phase, it is aimed to expand the implementation of the electronic/online exam system to cover all other faculties within universities (420 faculty).

Implementation of the electronic exams system on the national level will enable Egypt to take a substantial step toward green education by saving the tremendous amount of paper consumed in exams and achieve transparency and high-quality evaluation quality for the educational process. This will be available for public universities. It will run in more than 500 faculties at 27 universities with more than 200k devices to serve more than 2.2 million students with a cost exceeding EGP 4.4 billion (equipment, connection lines and the centralized data centers).

2. Systems/Applications

These are a set of applications and online systems made for both students and staff members. They include:
- Learning application for managing the interaction (LMS, Learning Management System) between staff and students across the educational process via a unified platform to manage the interaction 2.2 million students with around 120K staff, in cooperation with the Egyptian Knowledge Bank (EKB).
- Implementation of student information systems (SIS) applications for universities and institutes to manage student life at universities from all aspects.
- Applications for managing the supply chain processes (ERP, Enterprise Resource Planning) inside universities such as HR, Purchasing, Payroll, etc.
- Different applications for students such as hospitalities and digital libraries.

3. Infrastructure

The objective is to design, implement, and execute all new generation university infrastructure based on the latest technologies in compliance with international standards such as ISO 27001 for security solutions. The latest batch was composed of 15 national universities, 10 technological universities and 45 technical institutes.

4. Smart University/Campus

A new model for smart universities (SURA, Smart University Reference Architecture) was developed in co-operation with ITIDA (affiliated to Ministry of Communications and Information Technology, MCIT). This model describes 34 functions towards the full vision for a smart university.

5. Digital Content

Digital content for students such as digital books, lectures, seminars or other authoring tools are available for all students of the same programs across the country at different institutions.

6. Platforms/portals

Different platforms and portals that help the ministry and staff members manage the entire educational process. These platforms are:

- Researcher & Professor Portals (e-Science & e-Portfolio): The EKB is a prominent example, it is an initiative that has been launched by President Abdel-Fattah El-Sisi During the National Science Day of 2014. It is the world's largest digital library granting unlimited resources exclusively for Egyptians.
- Funding Resource Portal: It provides access to financial support to students for their education. Private and government agencies provide these funds for both long and short-term purposes.
- MOHESR Portal: An informative source about MOHESR responsibilities and services and day-to-day activities. It also provides information about affiliated entities and different services for MOHESR stakeholders
- National interface for MOHESR (Egypt Hub): The main gateway for the ministry, this portal presents all details for universities and institutions and acts as a collaboration platform between the ministry and higher education stakeholders. With around 2 million users on all e-learning platforms in 2021, it enabled Egypt to be number one on the level of Africa and the Arab Countries (Microsoft Services).
- Internet of Things (IoT) platform: It is a main platform in the IoT value chain to enable smart applications at universities through state-of-the-art labs and applied cases in different fields such as energy, water, and transportation.
- Study in Egypt: A platform designed to encourage foreign students to come to Egypt and study at Egyptian universities which has enhanced the number of enrolled students by more than 20%.

- Electronic admission and TANSEEK platforms: These are for public, national, and private universities to facilitate applying to different faculties at different universities, serving more than 600k students per year.

I.III.III INTERNATIONAL STUDENTS

Educational and cultural aspects constitute the prominent part of the 7th pillar of Egypt's Vision 2030 and are the basis of an established cultural diplomacy. This comes within the framework of the engagement of the Egyptian state with a critical file, that of international students in Egypt. This engagement takes place through the Study in Egypt program launched under the auspices of His Excellency of President Abdel-Fattah El-Sisi who generously provides his patronage with the aim of making Egypt the official education hub in the Middle East. Therefore, increasing the number of foreign students comes at the top of the list of priorities of the MOHESR, as the aim is to strengthen the role of cultural diplomacy and to form and empower Egypt's knowledge economy. Egypt has the potential to become a regional hub for educational services, given its great history in the field of higher education and scientific research, the distinguished level of Egyptian universities, the progress it has achieved in international rankings, and the human potential it possesses. International students in Egypt follow main three tracks:

1. Undergraduate Studies
2. Post-graduate studies
3. Arabic-language programs

Undergraduate Studies

International students can enroll in various programs offered by Egyptian universities and higher education institutes to pursue their undergraduate studies. This track provides them with access to a wide range of disciplines and educational opportunities. International students who aim to pursue undergraduate studies have been increasingly choosing Egypt over the past years. The interest shown in the Egyptian higher education system as a destination can be observed through the wide variety of nationalities of the international students enrolled in the current academic year 2022/2023, reaching 21,084 students. There are over 60 nationalities from around the world enrolled this year with about 75% of these students from Sudan, Kuwait, Syria, Palestine, and Jordan.

The number of international students in Egyptian universities has seen an increase, rising from 13,531 in 2014 to 21,084 in 2023. Among the Egyptian public universities and institutes that have taken part in the national initiative 'Study in Egypt', several universities have attracted a significant number of international students in the academic year 2022/23. These universities include Cairo University, Alexandria University, Ain Shams University, Mansoura University, and Zagazig University.

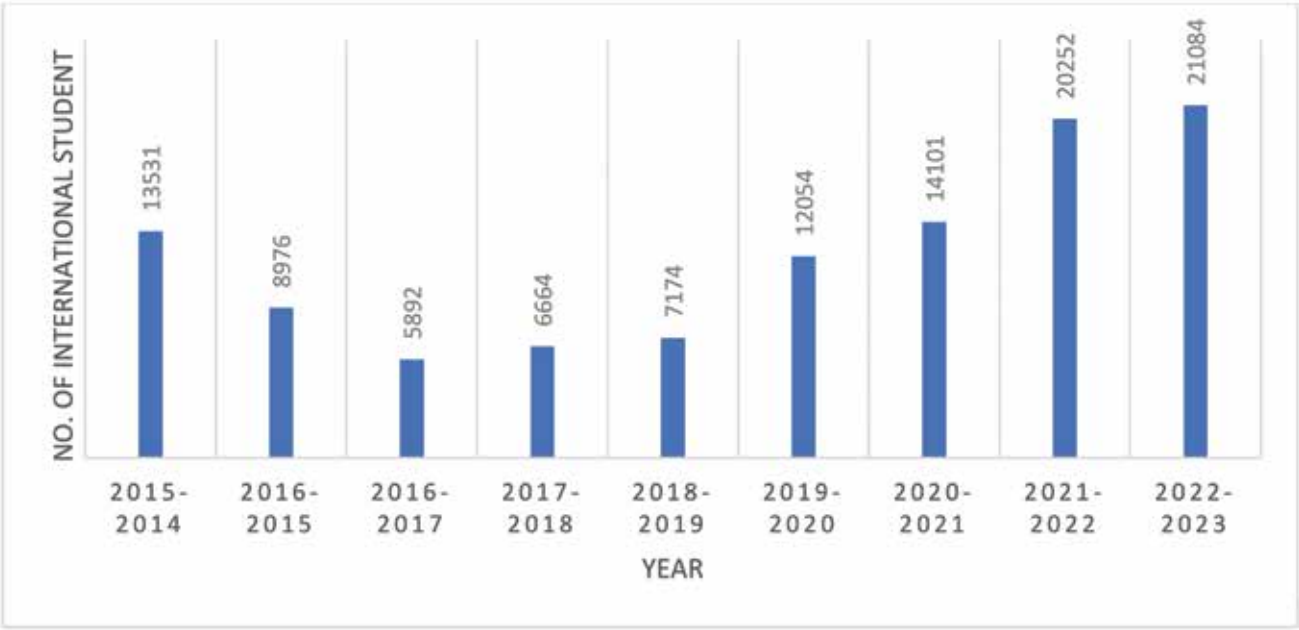


FIGURE (I - 20) : INCREASE OF INTERNATIONAL STUDENTS AT EGYPTIAN PUBLIC UNIVERSITIES AND INSTITUTES

TABLE 1: THE INCREASING NUMBER OF INTERNATIONAL STUDENTS ENROLLED IN PUBLIC UNIVERSITIES AND INSTITUTES.

THE INCREASING NUMBER OF INTERNATIONAL UNDERGRADUATE STUDENTS: UNIVERSITY (2014/2015-2022/ 2023)									
UNIVERSITY	2015-2014	2016-2015	2016-2017	2017-2018	2018-2019	2019-2020	2020-2021	2021-2022	2022-2023
CAIRO	3105	2199	1270	1688	2234	4080	4252	5271	8281
ALEXANDRIA	1028	1086	623	734	870	2189	2595	3022	3807
AIN SHAMS	1925	1498	894	959	786	1604	1958	2746	2259
ALMANSORA	683	441	387	659	930	1232	1832	3788	1715
ALZAGAZIG	917	211	193	352	624	682	696	1289	1360
HELWAN	370	202	165	252	278	492	667	844	735
INSTITUTES	586	572	575	573	613	807	776	2010	715
TANTA	1001	293	190	226	183	278	183	421	450
ASYUT	32	84	101	40	23	107	528	5	416
KAFR ALSHEIKH	14	104	97	195	161	130	133	187	205
SUEZ	67	58	30	14	21	85	117	99	172
BANHA	1613	1195	743	246	100	93	58	99	166
MENOUFIA	512	86	62	80	25	37	24	77	157
SUEZ CANAL	168	67	30	22	32	50	65	99	130
PORTSA	8	58	13	16	8	20	28	30	108
BENI SUEF	596	78	29	46	28	13	19	51	80
FAYOUM	37	78	25	29	44	37	33	40	71
DAMIETTA	35	44	16	15	29	37	38	44	70
ASWAN	4	5	2	113	36	6	11	24	56
ALMINYA	62	133	92	69	35	14	8	25	39
LUXOR	0	0	2	0	1	0	0	11	21
SOHAG	7	8	2	11	11	6	3	3	19
ARISH	0	0	32	25	26	28	24	24	18
SOUTH VALLEY	39	62	13	27	23	2	6	10	13
SADAT CITY	715	408	291	262	36	17	31	29	10
MATROH	0	0	4	0	1	2	11	3	6
DAMANHOUR	7	6	11	10	15	6	3	1	4
NEW VALLEY	0	0	0	1	1	0	2	0	1
TOTAL	13531	8976	5892	6664	7174	12054	14101	20252	21084

Among international students, certain fields of study are particularly preferred. These fields include medicine, dentistry, pharmacy, physical therapy, veterinary medicine, engineering, fine arts, applied arts, ICT, agriculture, science, and economics & political science. Notably, medicine stands out as the most sought-after program among international students.

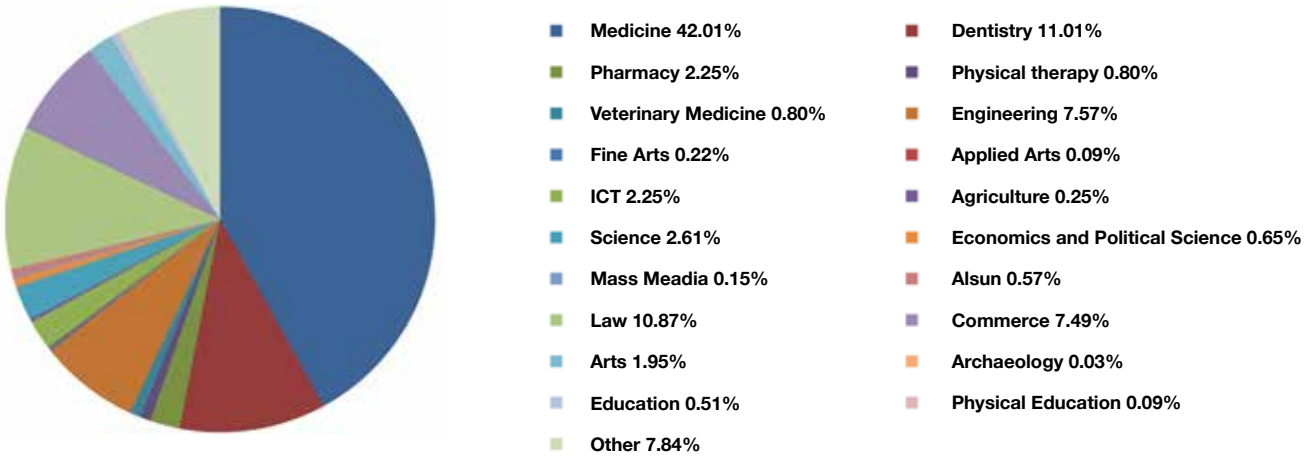


FIGURE (I - 21) : PREFERRED PROGRAMS FOR INTERNATIONAL STUDENTS IN EGYPT

Postgraduate Studies

In the academic year of 2022/23, a total of 3,820 researchers from diverse nationalities showed interest in pursuing postgraduate studies programs in Egypt. Most of these researchers comes from Arab countries. Since 2014, the admission process has been facilitated through the Study in Egypt platform for the application procedures for international students. International students prefer various fields of postgraduate study in Egypt. These fields include medicine, dentistry, pharmacy, physical therapy, veterinary medicine, engineering, fine arts, applied arts, information and communication technology (ICT), agriculture, science, economics & political science, mass media, languages/alsun, law, commerce, arts, archaeology, education, physical education, and other specialized programs.

Arabic Language Programs

The Egyptian Cultural Center for Teaching the Arabic Language is a strong asset in the international student system in Egypt. It offers different courses including courses especially tailored for the scholarship students who have the opportunity to learn Arabic before and during their study duration in Egypt. Currently the center is witnessing great interest as several specialized experts in the field of teaching Arabic to non-native speakers have been called upon with the aim of developing work in the center. It also has been equipped with modern means of communication, technological teaching aids, and new display screens, in addition to the availability of a language laboratory and the electronic library connected to Bibliotheca Alexandrina and the Egyptian Knowledge Bank. The center also provides international students with a great opportunity to study the Arabic language and learn about its culture, helping them reach a high level of international language proficiency through the full immersion method. Standard Arabic Language Teaching Program, the Colloquial Egyptian Dialect Learning Program, Arabic Calligraphy Learning Program, and the Skills Development Program are some of the programs available in addition to programs for special purposes such as diplomatic studies, media, or others.

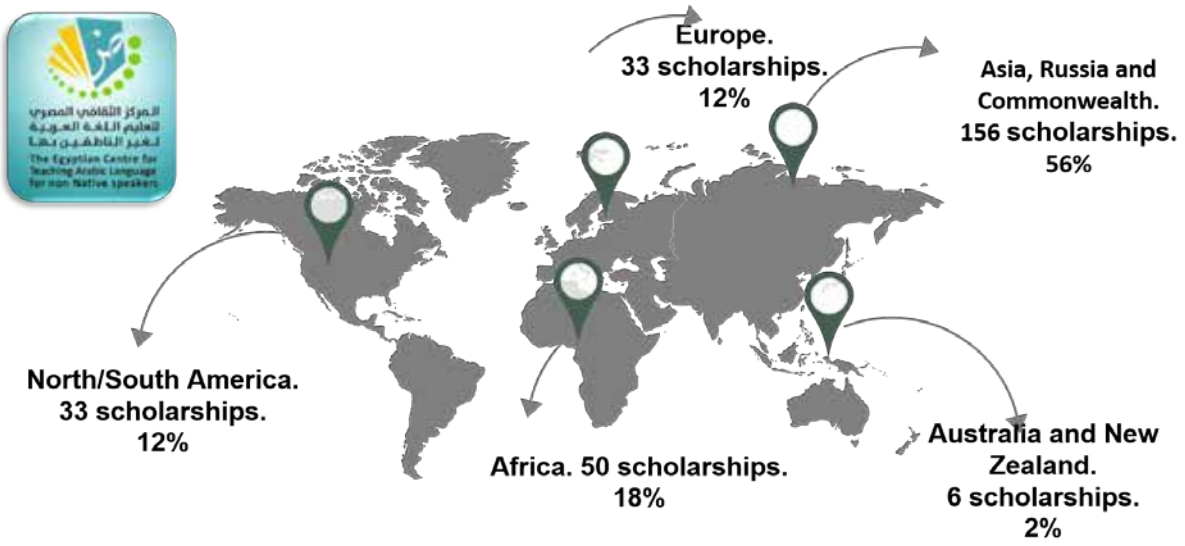


FIGURE (I - 22) : ARABIC LANGUAGE SCHOLARSHIPS AROUND THE WORLD

I.III.IV FACULTY

Student-to-Staff Ratio

The Student-to-Staff Ratio (SSR) is one of the factors affecting the quality of education delivery. The higher ratio likely indicates lower quality of education, while the lower ratio leads to improved teaching and learning outcomes. It is often seen as a mark of prestige for the university. Additionally, a lower ratio means better opportunities for social engagement and individual attention. A balance in the SSR can lead to more efficient use of resources and facilities. A higher number of staff lowers the workload on staff which also plays a crucial role in creating a positive learning environment. To ensure the best outcomes for students, staff members should be given a manageable workload that allows them to effectively monitor and support their students and regularly assess and improve the content of their courses. It is assumed that the ratio for the social studies/sciences should not exceed 50 students per faculty, whereas it should decrease to 25 students in the medical, engineering, life and natural science sectors. In this context, the required SSR serves as a useful indicator for determining the quality of education.

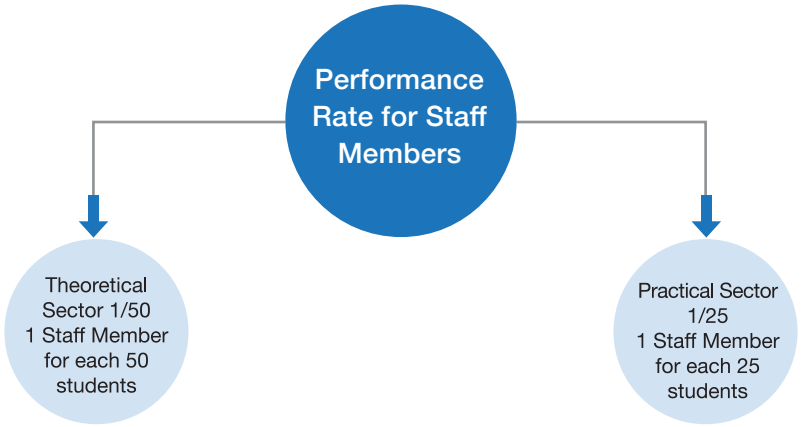


FIGURE (I - 23) : PERFORMANCE RATE OF STAFF MEMBERS IN THEORETICAL AND PRACTICAL SECTORS

A study was made to calculate SSR in the main disciplines sectors according to the number of students enrolled in both sectors.

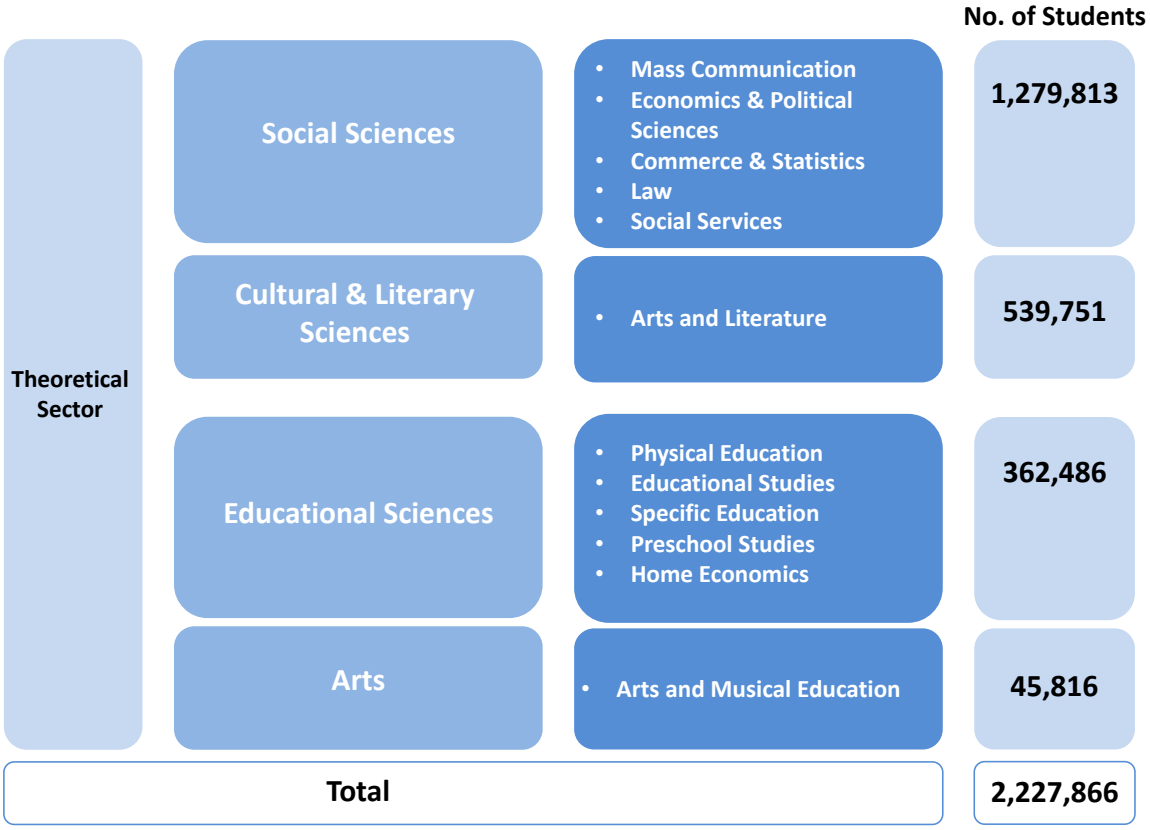


FIGURE (I - 24) : THEORETICAL SECTORS – NUMBER OF STUDENTS AND PROGRAMS FOR YEAR 2020

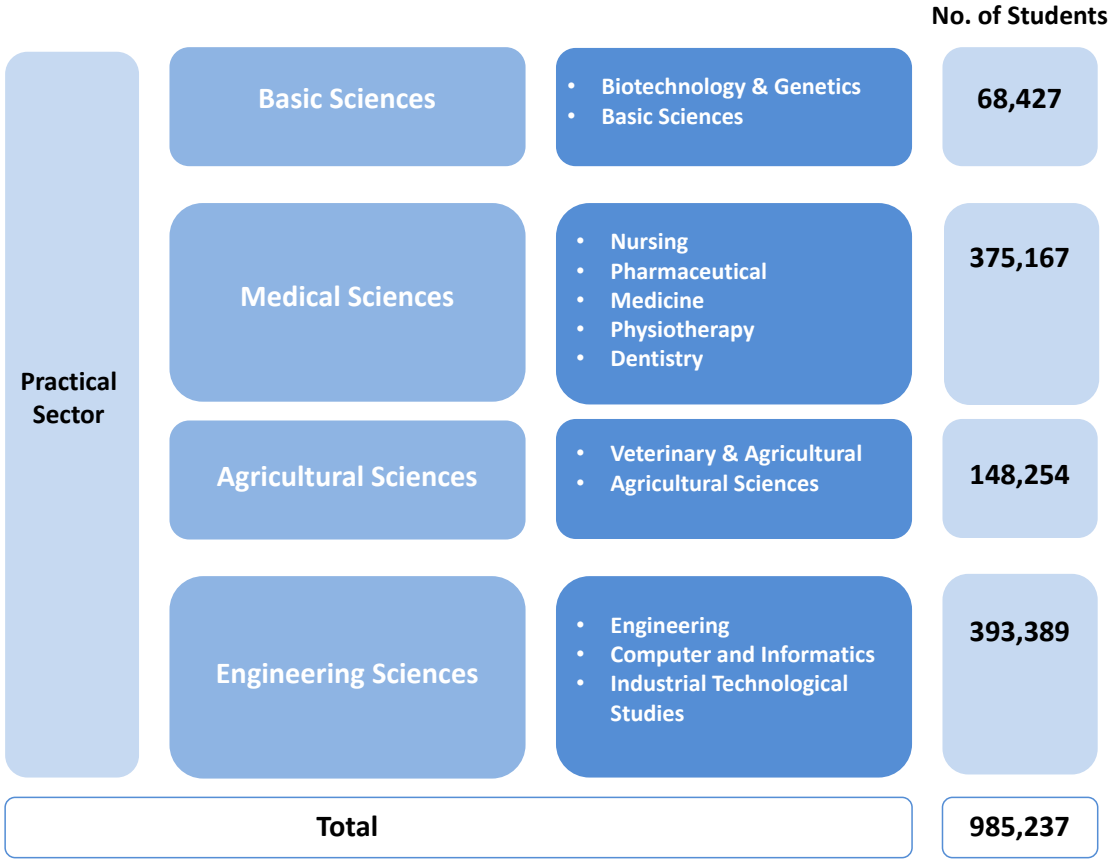


FIGURE (I - 25) : PRACTICAL SECTORS – NUMBER OF STUDENTS AND PROGRAMS FOR YEAR 2020

According to the current status, the number of faculty across the seven regions of Egyptian higher education follows the required benchmark of 25 students per staff member in the practical sector. The SSR reaches 9,1021 and 25 for basic, medical, agricultural, and engineering sciences respectively. However, the theoretical sector shows a deficit in the number of staff members required for social sciences. The SSR reaches 134 with a need for 16,068 staff members to attain the benchmark of SSR 50. On the other hand, arts, educational, cultural, and literary sciences indicate an acceptable SSR of 16, 39, and 47 respectively. To understand the deficit apparent in social sciences, the total number of students in practical (985,237) and theoretical (2,227,866) sectors is compared. The percentage of students enrolled in social sciences is much higher reaching 69% of students, causing the deficit in the number of staff. However, in 2032 it was estimated that this percentage would decrease to 55% based on the new directions of academic programs that would attract more students to the practical sciences. Accordingly, the current deficiency of staff members in the social sciences may be mitigated. In addition, attention should be given to engineering staff members as they barely fulfill the benchmark indicating a need that may arise to increase staff members.

TABLE 2: STUDENT-TO-STAFF RATIO (SSR) IN THEORETICAL & PRACTICAL SECTORS

	NO. OF STUDENTS (2020)	MINIMUM NO. OF STAFF NEEDED	ACTUAL NO. OF STAFF (2020)	STUDENTS-TO-STAFF RATIO (SSR)
PRACTICAL SECTOR				
BASIC SCIENCES	68427	2737	7340	9
MEDICAL SCIENCES	375167	15007	36239	10
AGRICULTURAL SCIENCES	148254	5930	7124	21
ENGINEERING SCIENCES	393389	15736	15965	25
TOTAL	985237	39409		
THEORETICAL SECTOR				
SOCIAL SCIENCES	1279813	25596	9528	134
CULTURAL & LITERARY SCIENCES	539751	10795	11594	47
EDUCATIONAL SCIENCES	362486	7250	9325	39
ARTS	45816	916	2823	16
TOTAL	2227866	44557		

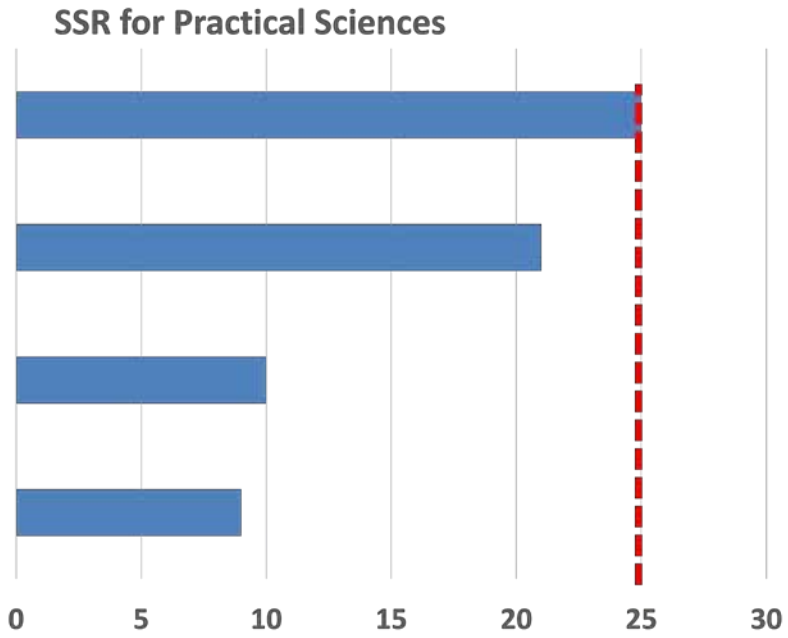


FIGURE (I - 26) : STUDENT-TO-STAFF RATIO (SSR) IN PRACTICAL SECTORS

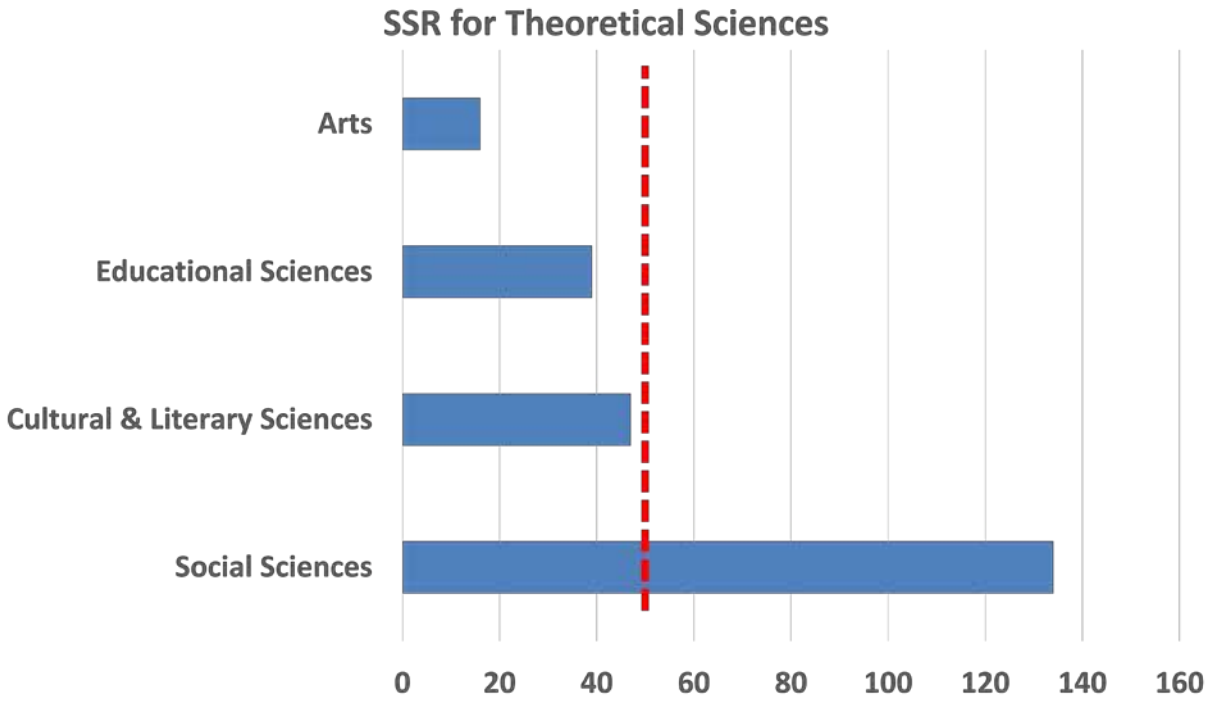
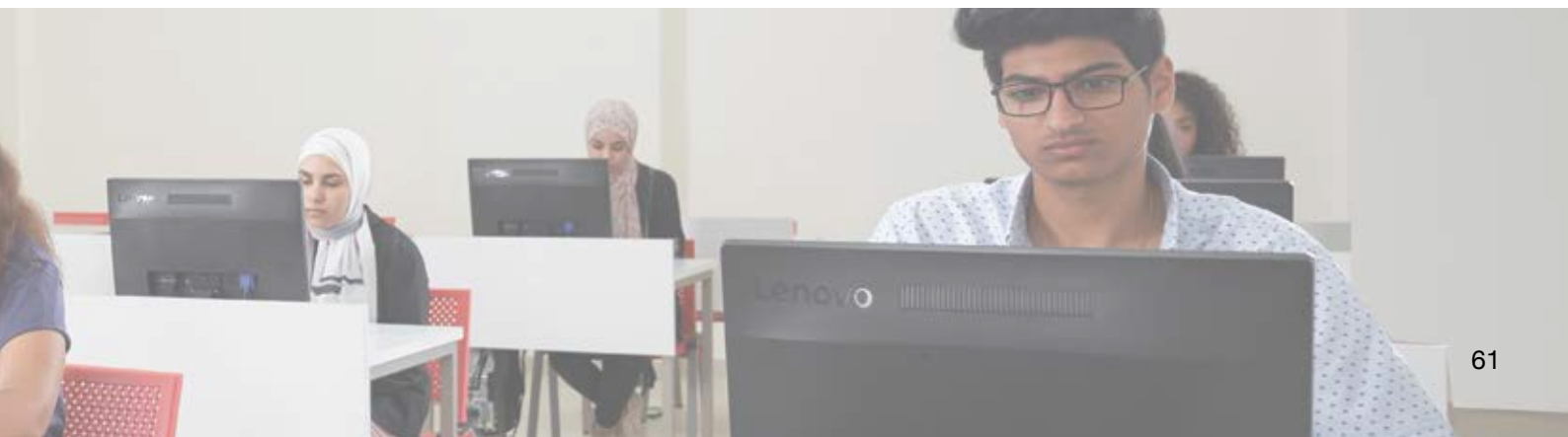


FIGURE (I - 27) : STUDENT-TO-STAFF RATIO (SSR) IN THEORETICAL SECTORS



Capacity Building Programs for Faculty

Capacity building bridges the digital divide for the higher education community involved in the development of a certificate for digital transformation with a standard curriculum and training courses for faculty and students. This model was applied to prepare cadres to position each university for full digital readiness. Preparing cadres of faculty who can realize the vision and help students achieve the necessary competences and link them to the labor market is being realized through:

1. Raising the efficiency of faculty to work within interdisciplinary programs that serve local problems such as energy problems and climate change.
2. Facing societal problems that may require the formation of a team of experts from overlapping disciplines and trans-disciplinary disciplines that merge with industry and society.
3. Understanding the changing labor market, which may require the combination of disciplines and their flexibility in the face of emergency changes.

Training	**1. To target a number of researchers in public universities**
Expansion	**2. Interdisciplinary sciences and the establishment and updating of regulations for the expansion of interdisciplinary programs in public and private universities**
International Distinction	**3. Interdisciplinary science and programs in scientific research to achieve competition in the interdisciplinary work, especially quality of life and competitiveness in the indicators of sustainable development, including in the labor market.**

FIGURE (I - 28) : ROADMAP FOR IMPROVING STAFF MEMBER QUALIFICATIONS.

Arab Republic of Egypt

وزارة التعليم العالي والبحث العلمي

Ministry of Higher Education
& Scientific Research

I.IV
THE RESEARCH, INNOVATION, AND IMPACT TRACK

I. CURRENT STATUS

I.IV.I STATISTICS OF SCIENTIFIC RESEARCH

In Egypt, the research landscape is represented in research centers and universities, both contributing to the country's research capacity. Research centers dedicate their efforts to scientific research, whereas universities allocate 40% of their workload to scientific research. Research centers include 11 centers affiliated with the MOHESR with about 7000 research staff and assistants. While other ministries have 15 centers and more than 15,000 research staff and assistants. In addition, the private sector includes about 300 centers with over 4,800 researchers. Governmental and private universities in Egypt also play a significant role in advancing scientific research in the country.

These universities encompass a substantial workforce, with over 118,000 staff members and over 250,000 master's and PhD researchers.

Regarding Egypt's global ranking, according to SCImago Journal and Country ranking (SJR), Egypt reached an h-index equal to 369 with a total number of documents at 346,036 cited 4,702,497 times, with the average citation per document at 13.59 in all subject areas. Egypt ranked 24th globally for total scientific production according to the 2022 ranking.

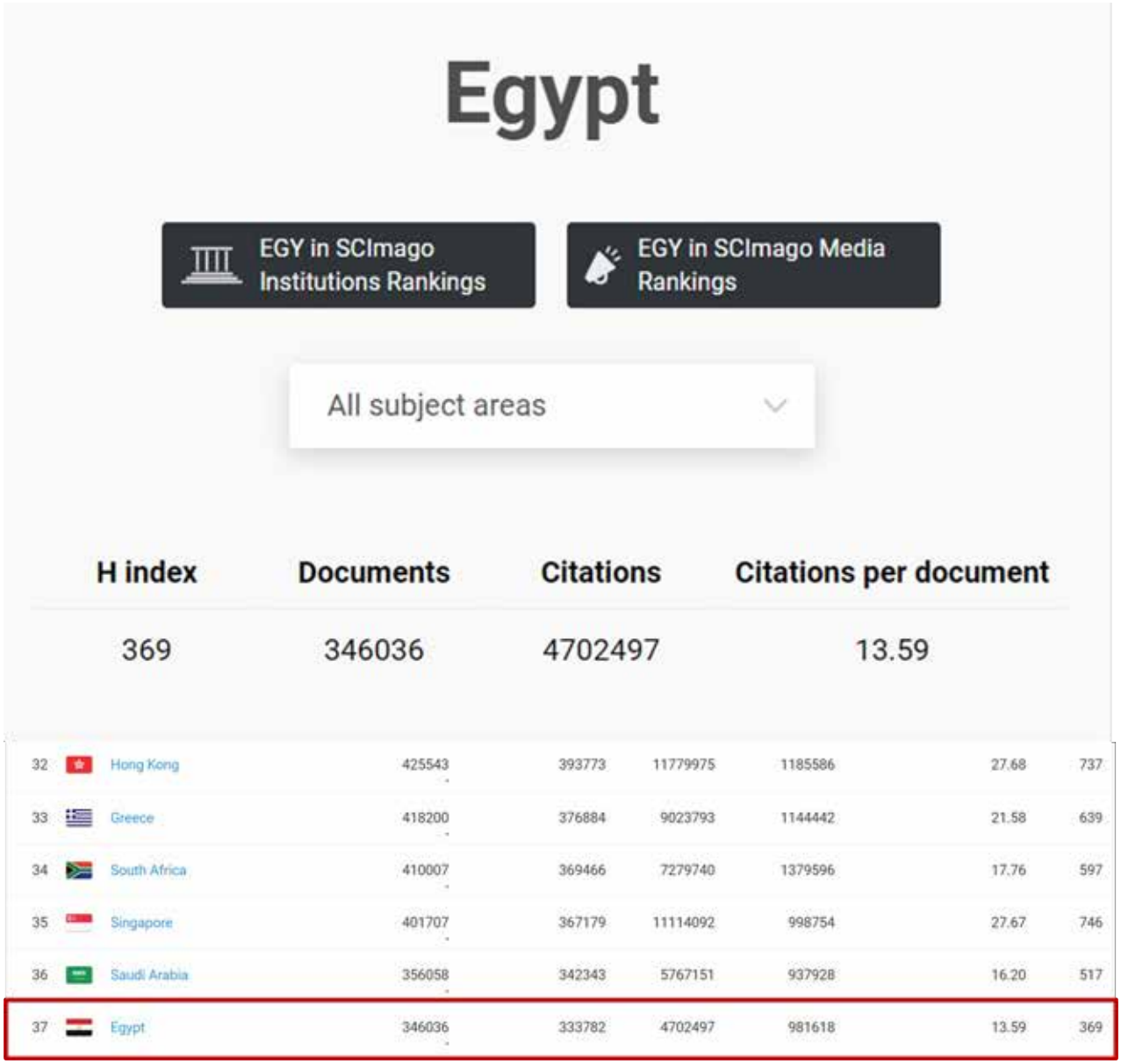


FIGURE (I - 29) : THE RANK OF EGYPT IN SCIENTIFIC RESEARCH DURING 1996–2022

Egypt makes a significant contribution to scientific research as an African and Arab country. It contributed about a quarter of the research output of the Arab countries and Africa in 2020. As an African country, Egypt's research output percentage to the whole production of Africa increased from 21% in 1996 to 26.86% in 2022. In addition, as a country of the Middle East, it contributed about 14% of total research output in 2022. Its contribution to the world saw a slight increase in the last decade to reach 1% of global research output, while 4 times increase when compared to 0.25% in 1996.

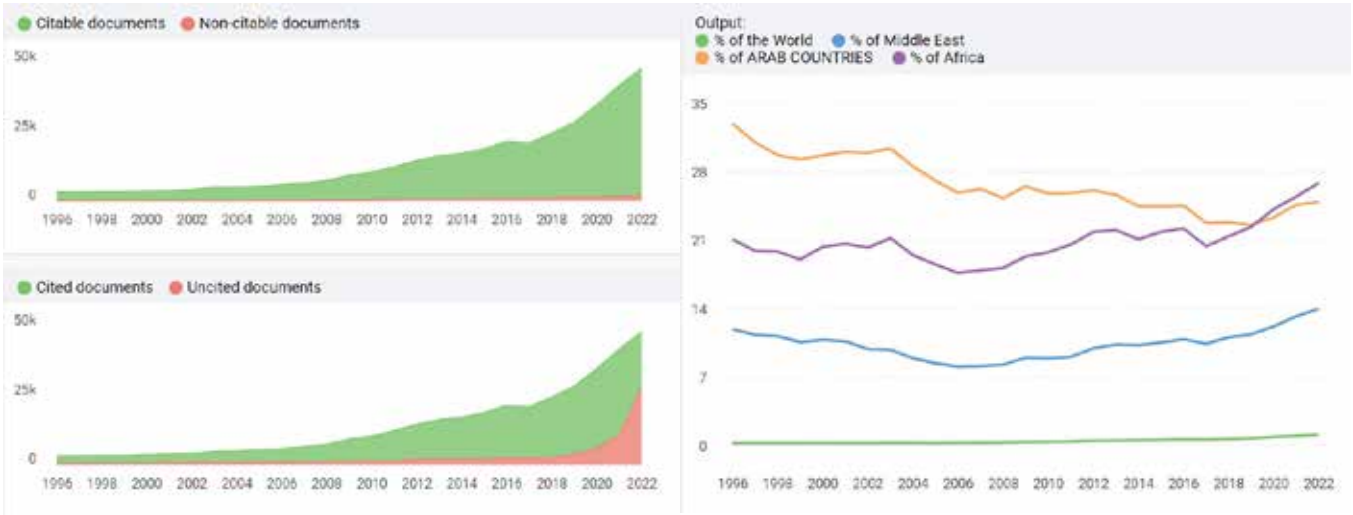


FIGURE (I - 30) : CITED RESEARCH DOCUMENTS ACROSS THE YEARS IN EGYPT

According to SciVal, there is significant progress in the last decade where the number of publications has more than tripled. In 2011, the number of publications was 11,359, whereas it reached 44,198 in 2022. Egypt's rank rose from 40 to 25, and international collaboration increased from 40.9% to 58.6%. During the period 2018-2022, medicine and engineering are the foremost fields with above 70k pieces of scholarly output each. In addition, the field-weighted citation impact (FWCI) increased from 1.19 to 1.43 where the preceding fields are economics, mathematics, and physics and astronomy with FWCI above 1.5.

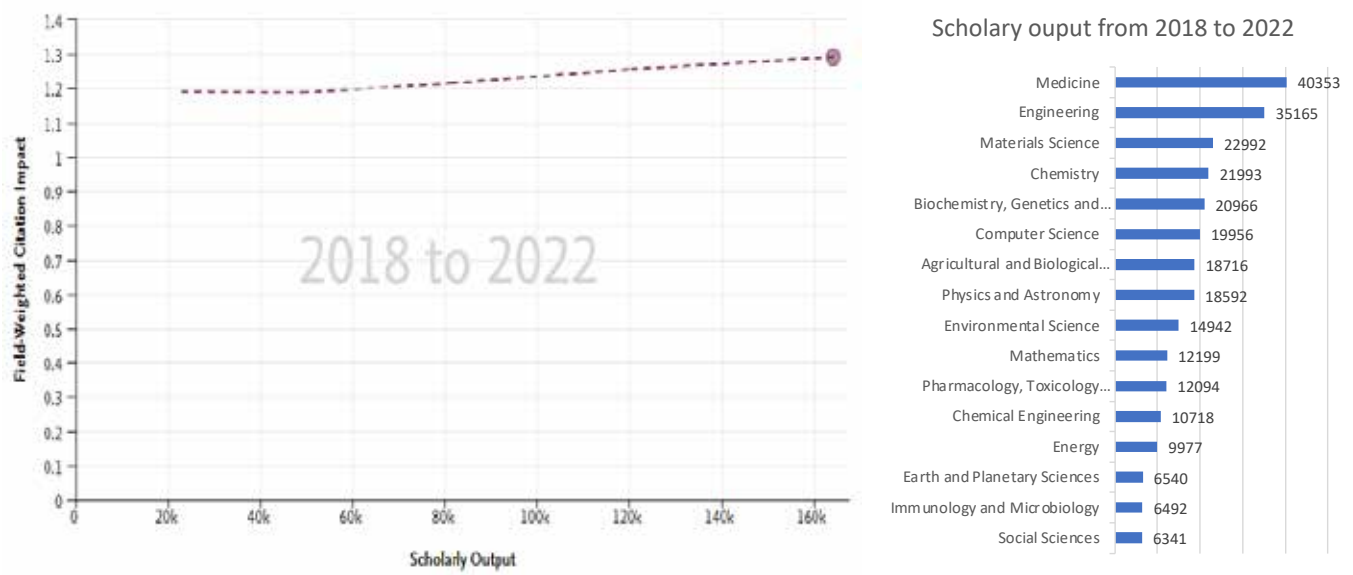


FIGURE (I - 31) : THE INCREASE IN SCHOLARLY OUTPUTS, RESEARCH AREAS AND FWCI FROM 2018 TO 2022 ACCORDING TO SCIVAL

According to the SciVal benchmarking, Egypt attained second place among the African and Arab world in terms of scholarly output in 2022 with total scholarly output of 44,198.

Benchmark multiple metrics | Reset to one metric over time

Heatmap

Metric value: Low High

Entity	Field-Weighted Citation Impact	Scholarly Output
Saudi Arabia	1.66	59,036
Egypt	1.43	44,198
South Africa	1.34	35,350
Iraq	1.04	20,131
Nigeria	1.17	17,993
United Arab Emirates	1.73	16,682
Morocco	1.22	12,828
Ethiopia	1.02	11,944
Algeria	1.02	11,072
Tunisia	1.15	10,498

FIGURE (I - 32) : EGYPT'S SCIENTIFIC RESEARCH CONTRIBUTION RANK IN AFRICA AND THE MIDDLE EAST IN 2022 ACCORDING TO SCIVAL

According to the Clarivate database, Egypt leads the countries in the Middle East and Africa (MEA) in the number of publications with 35,187 publications in 2021. In comparison to 2017, there is an 82% increase in publications with steady progress between 2017 and 2021. In addition, the Category Normalized Citation Impact (CNCI) for Egypt versus countries in the MEA shows the high impact of research output for Egypt. It illustrates that Egypt is above the world average throughout the five years (2017-2021). The CNCI has risen from 1.01 in 2017 to 1.28 in 2021 which is the second best after Jordan with a difference of 0.04 in 2021.

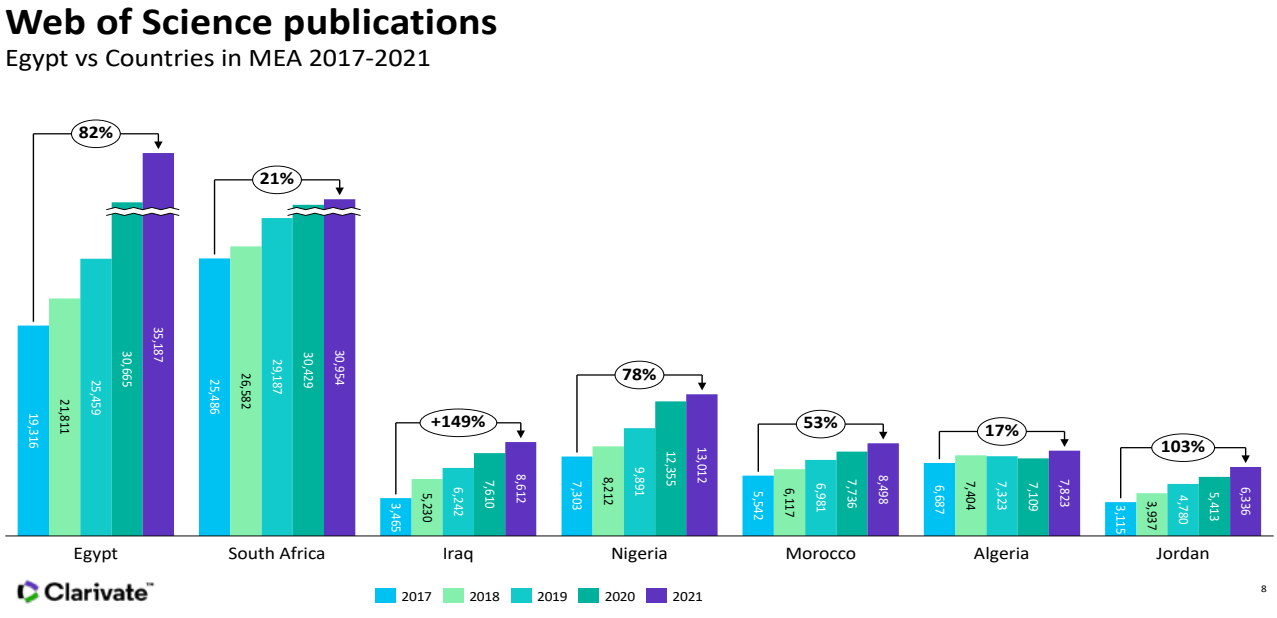


FIGURE (I - 33) : EGYPT VS OTHER COUNTRIES – WEB OF SCIENCE PUBLICATIONS 2017-2021

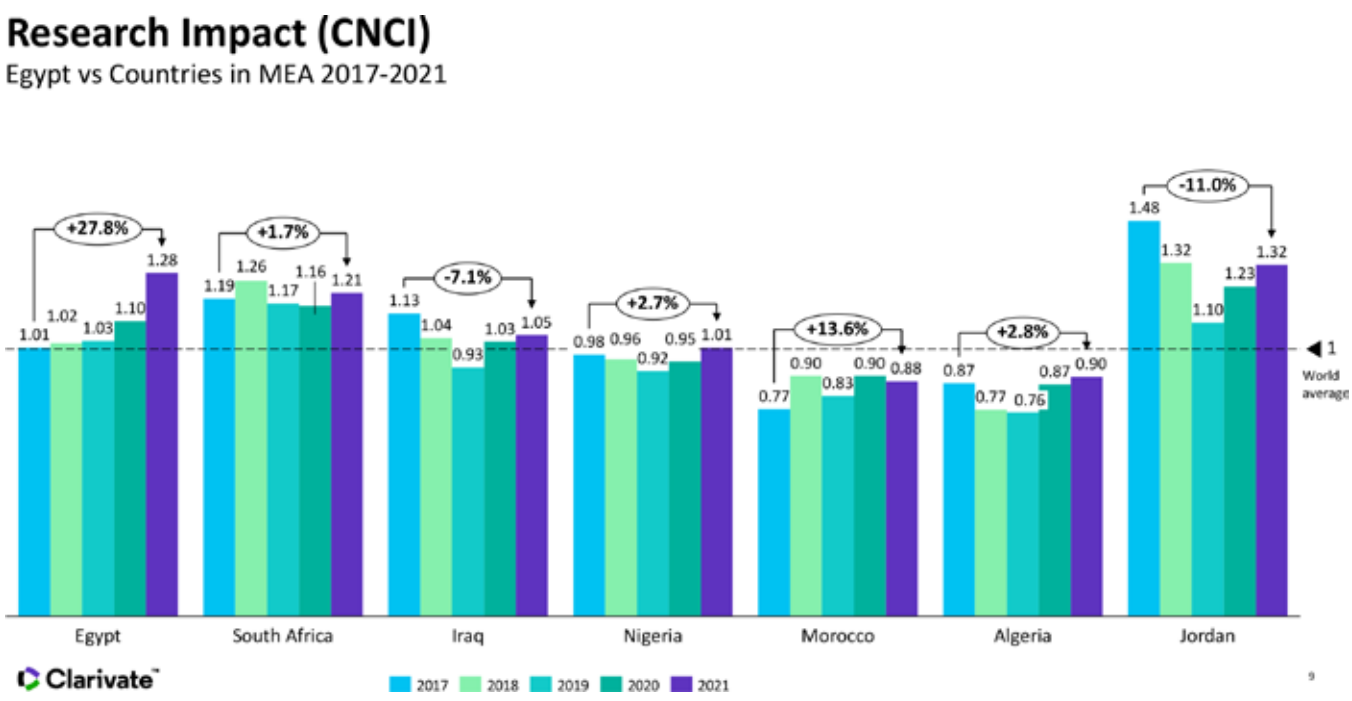


FIGURE (I - 34) : HIGH-SKILLED IMMIGRATION IN THE LEAST-DEVELOPED COUNTRIES (LDC)

The brain drain index of Egypt is 5.1 which considers the economic impact of human displacement (for economic or political reasons) and the consequences that this may have on a country's development. The higher the index, the greater the migration of competencies from one country to another. And according to the UNCTAD, Egypt is not included among the countries of high brain drain with a rate below 10%.

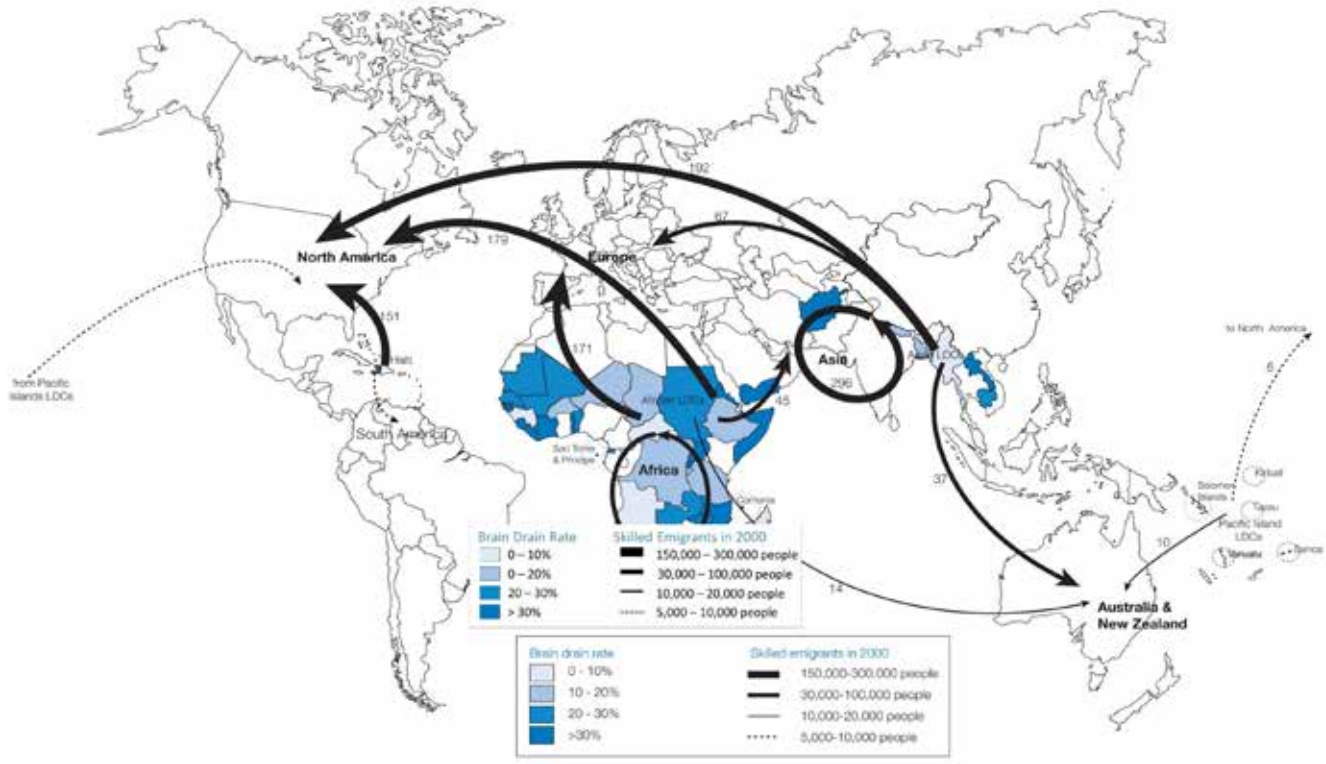


FIGURE (I - 35) : THE LEAST DEVELOPED COUNTRIES (LDC) THAT CHALLENGE HIGH-SKILLED IMMIGRATION

In 2022, Egyptian universities and research centers achieved notable progress in the international rankings, showcasing their remarkable advancements, for example:

- The number of Egyptian universities listed on the 2022 Times Higher Education Impact Rankings increased to 36, demonstrating significant growth compared to the 31 universities featured in the rankings in 2021.
- The commitment of 1,406 universities from 106 countries to the United Nations Sustainable Development Goals (UN-SDGs) was recognized in 2022.
- Among the global higher education institutions listed in the British Times Higher Education classification for 2023, 26 Egyptian public and private universities were included.
- In the US NEWS global classification for 2022/2023, 19 Egyptian universities secured a place among the top 2,000 universities worldwide.
- The Shanghai Chinese General Classification for Academic Specializations in 2022 featured 24 Egyptian universities, a significant increase from the previous year's count of five.
- The Spanish SCImago classification for 2022 listed 42 Egyptian universities, marking a growth compared to the 35 universities included in 2021.
- In the Shanghai Chinese General Classification (ARWU), seven Egyptian universities were recognized in 2022, compared to six in 2021.
- Egypt's National Research Center claimed the top position in SCImago Lab's ranking of research centers in the Middle East and North Africa (MENA) region. Additionally, three other Egyptian research centers, the Agricultural Research Center (4th), the Atomic Energy Authority (5th), and the Petroleum Research Institute (7th), were ranked among the top ten.
- The Webometrics Ranking of World Universities in 2022 included 76 Egyptian educational and research institutions, showcasing an increase from the 72 listed in 2021.
- According to a report by SCImago in April 2023, Egypt ranked 24th out of 233 countries worldwide in terms of international publishing in 2022, an improvement from 28th place in 2020. The report highlighted that Egypt published a total of 43,848 papers in globally indexed journals in 2022, compared to 31,736 in 2020, representing a notable increase of 38%.

I.IV.II THE ROLE OF MOHESR IN ADVANCING SCIENTIFIC RESEARCH

The Egyptian Ministry of Higher Education and Scientific Research fosters collaboration among researchers and various organizations to enhance Egypt's knowledge economy. This approach, inspired by the United States' creation of the Biomedical Advanced Research and Development Authority (BARDA) in 2006, aims to connect researchers nationwide. The ministry has set five principles to facilitate interdisciplinary research within Egypt.

WHAT DO WE NEED TO FACILITATE CONDUCTING INTERDISCIPLINARY RESEARCH IN EGYPT?

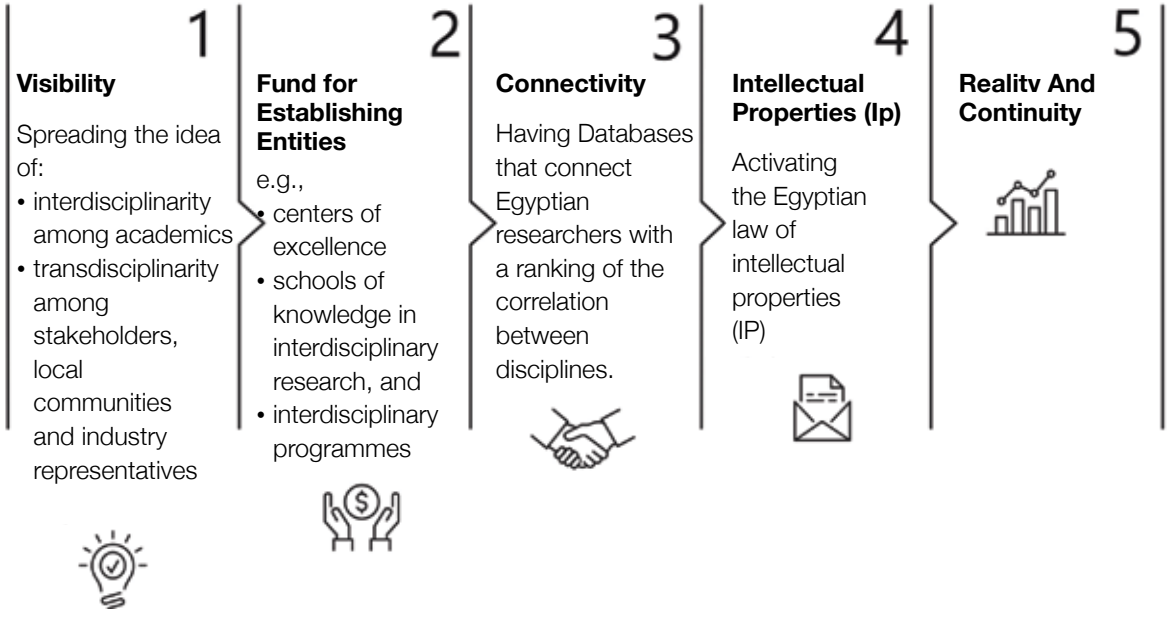


FIGURE (I - 36) : FIVE STEPS NEEDED TO FACILITATE INTERDISCIPLINARY RESEARCH IN EGYPT.

The MOHESR has developed a plan with the support of the Clarivate office responsible for the Middle East and North Africa region, to support Intellectual Property Rights (IPR) in scientific research and higher education. Intellectual Property (IP) in education is the key to boosting the impact of applied research and its outcomes. A well-structured strategic policy with set regulations can support researchers and institutions and help ensure the quality of their work and guarantee its maintenance. It can also allow administrators to create economic value out of it. Clarivate supports all MOHESR key stakeholders at every step and provides researchers with the vital tools and techniques needed to achieve the agreed-upon strategic aims (Clarivate, 2020). The benefits of this approach lie in discovering ways to enhance the institution's performance at every level.

I.IV.III SUPPORTING AUTHORITIES AND MISSIONS PROGRAMS

A. The Science, Technology & Innovation Funding Authority (STDF)

In 2006, the MOHESR initiated an ambitious effort to renovate Science and Technology (S&T) initiatives in Egypt. By 2007, this endeavor resulted in a comprehensive restructuring of Egypt's Science and Technology governance and management model, along with the establishment of the Science, Technology & Innovation Funding Authority (STDF).

The STDF has motivated the Egyptian scientific community by offering funding for exceptional research papers and fostering scientific collaborations with experts from advanced nations. Through the STDF, Egypt ensures it keeps up with rapid technological advancements and remains open to diverse societies and emerging economic unions. This approach allows the country to effectively compete on a global scale, link scientific research with technological progress, and involve civil society institutions in a cohesive scientific research system. It is crucial to continue implementing robust and ambitious plans and programs to further enhance scientific research, which will have positive impacts on the national economy and societal development.

To realize STDF vision and accomplish its mission, which focuses on building and strengthen Science and Technology (S&T) through capacity building of community and infrastructure in the valued strategic areas of Egypt's long-term competitiveness and development, the following objectives are set:

- Enhancing the research and development environment.
- Allocating financial resources and funding for scientific research and technology development.
- Supporting and developing the innovation capabilities of the science and technology community.
- Supporting the entire process of scientific research and product development.
- Disseminating information on science and technology in Egypt.
- Exploring fund-raising mechanisms to support STDF activities.
- Strengthening the role of STDF as prominent research funding organization and continuously improving its effectiveness and performance.

FIGURE (I - 37) : THE SCIENCE, TECHNOLOGY & INNOVATION FUNDING (STDF) AUTHORITY

The authority provides support to a significant number of research initiatives, including 16,500 proposed projects and 4,869 funded projects. These endeavors involve the collaboration of 20,000 associate researchers, with 804 projects currently in progress. Notably, there has been a substantial increase in funding rates in recent years. The funds allocated to public entities, private entities, and national universities have also experienced notable growth.

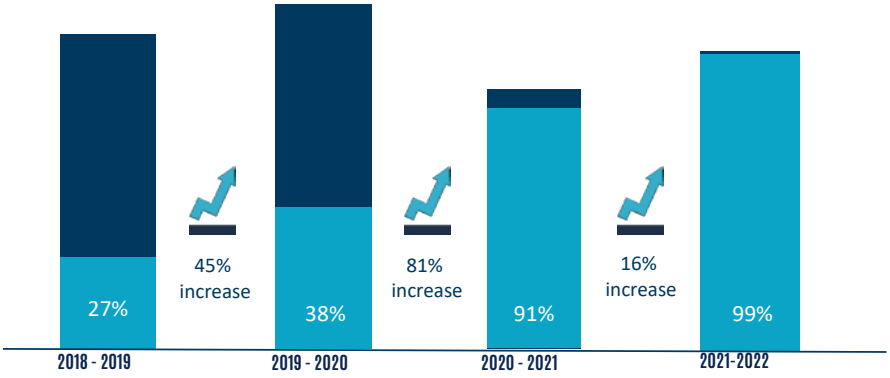


FIGURE (I - 38) : THE INCREASE IN RATES OF FUNDING

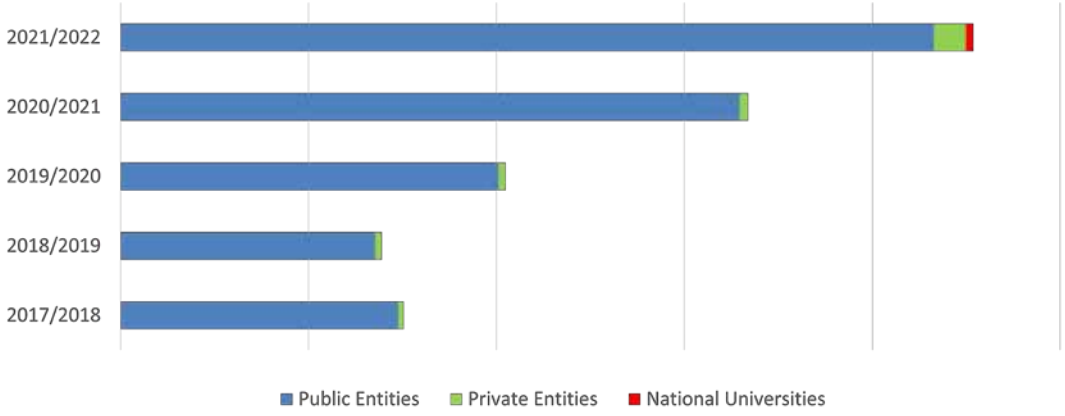


FIGURE (I - 39) : THE INCREASE IN FUNDS FOR DIFFERENT ENTITIES OVER THE YEARS

The STDF has provided funding for numerous national projects through various programs, including Development & Innovation Grants, STDF - Youth, Special Targeted Call Grants, and Capacity Building Grants. From 2019 to 2022, a total of 773 projects have received support from these funding initiatives.

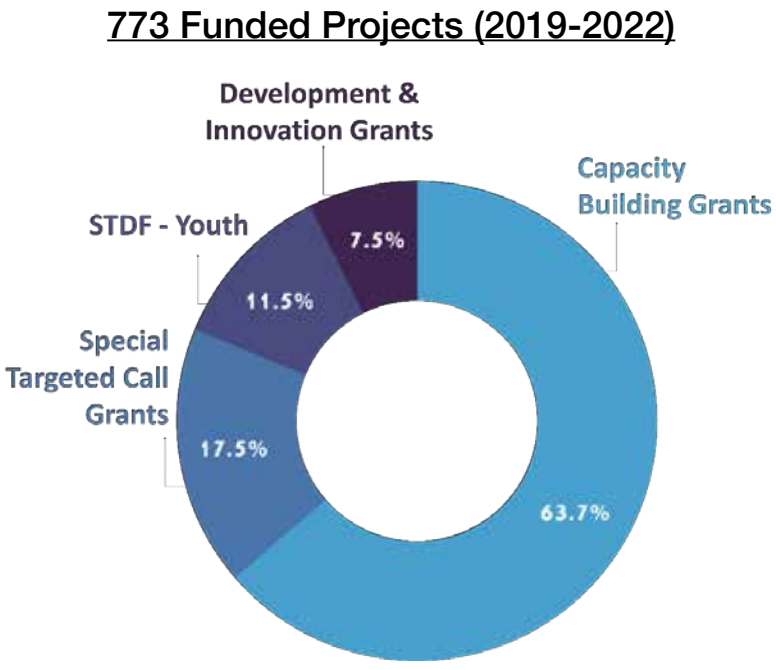


FIGURE (I - 40) : NATIONAL PROJECTS FUNDED WITH DIFFERENT GRANTS

B. The Academy of Scientific Research & Technology

The Academy of Scientific Research & Technology (ASRT), known as the Egyptian house of expertise and national think tank, serves as a unifying platform for exceptional Egyptian scientists and experts from various sectors, such as universities, research institutions, the private sector, NGOs, policymakers, and the diaspora. Their collective purpose is to address national challenges by proposing and conducting scientific studies, as well as formulating future strategic plans.

ASRT operates under a comprehensive development plan aimed at advancing Egyptian science and technology. It collaborates closely with national ministries and research institutions to establish an integrated system for scientific research. The primary objectives include increasing the number of skilled scientists in Egypt, granting science a central role in the country's development and knowledge-based economy, and promoting and supporting the participation of women and youth in science, technology, and scientific leadership. Furthermore, ASRT is considered the main governmental supporter of the complete cycle of innovation in Egypt. It proposes and funds STI, with a special focus on innovation, basic and emerging sciences, and national multi-institutional multidisciplinary mega projects through knowledge and technology alliances (KTA) and national scientific networks.

FIGURE (I - 41) : ASRT IS THE MAIN SUPPORTER OF THE INNOVATION ECOSYSTEM IN EGYPT

ASRT has several mandates that drive its mission and activities, including:

- Developing scientific solutions and strategic studies for national challenges through its 20 Specialized Scientific Councils, consisting of 300 ASRT Fellows, 20 National committees, and 200 members.
- Recognizing excellence in Science, Technology, and Innovation (STI) through State Prizes, STI indicators, evaluation, monitoring, and benchmarking.
- Providing essential national central core facilities such as Scientific Publishing, Internationalization of Local Journals, Digital Library, ENSTINET, GLORIAD, cloud computing, grid computing, Super Computing, EScience, and Egyptian Knowledge Bank (EKB) .(Egyptian Knowledge Bank).
- Supporting national industry, technology transfer, and strengthening local manufacturing through initiatives like the Egyptian Patent Office, IPR Help Desk, Quick Prototyping Fund, National Network of Technology and Innovation Commercialization Offices (TICOs), Regional Technological Incubators, and knowledge and technological alliances (KTAs).
- Proposing, funding, and managing National Multidisciplinary and Multi-institutional Applied Projects, Initiatives, and Campaigns to address national problems and needs.
- Establishing, supporting, and managing National and International Scientific Research Networks in both Basic and Converging Sciences, as well as joint R&D labs and centers such as (China-Egypt Joint Lab of Renewable Energy, MATS,etc)
- Empowering youth and women in STI through

initiatives like (Children's University, Scientists for Next Generation, Egyptian Young Academy of Sciences, National Committee of Women, My project, my future, etc.)
- Promoting science and society engagement by simplifying scientific knowledge, fostering scientific culture, innovative science education, science explainers, scientific publications, TV programs, translations of scientific books, exhibitions, Cairo Innovates, 1001 Inventions, workshops, forums, and scientific festivals.
- Proposing, funding, and conducting social studies and humanities surveys.
- Serving as the main governmental supporter of the complete innovation cycle in Egypt by proposing and funding STI projects, with a particular emphasis on Innovation, Basic and Emerging Sciences, and National Multi-institutional Multidisciplinary Mega Projects through Knowledge and Technology Alliances (KTAs) and National Scientific Networks.

FIGURE (I - 42) : OUTPUTS OF THE ACADEMY OF SCIENTIFIC RESEARCH AND TECHNOLOGY PROGRAMS (2014-2022)

The Academy's third executive plan (2022-2026) works to achieve the Ministry's strategy, Egypt's vision for sustainable development, the state's strategy for science, technology and innovation (2030), Egypt's climate strategy (2050) and the United Nations Development Goals (SDGs). To this end, the Academy is focusing on reinforcing local manufacturing and has introduced a series of new executive programs, initiatives, and projects that adhere to the Ministry's strategic orientations. The execution plan is set to bridge the gap between scientific research and industrial as well as societal needs, enhance local manufacturing capabilities, and foster regional development. It also aims to facilitate the integration and global connection of the Egyptian scientific community, boost Egypt's standing in international rankings, encourage the conservation of the environment and green innovation, and lure international scientific entities to establish their presence in Egypt. Moreover, it supports cooperative programs within the Arab region, as well as those in Euro-Mediterranean and African partnerships.

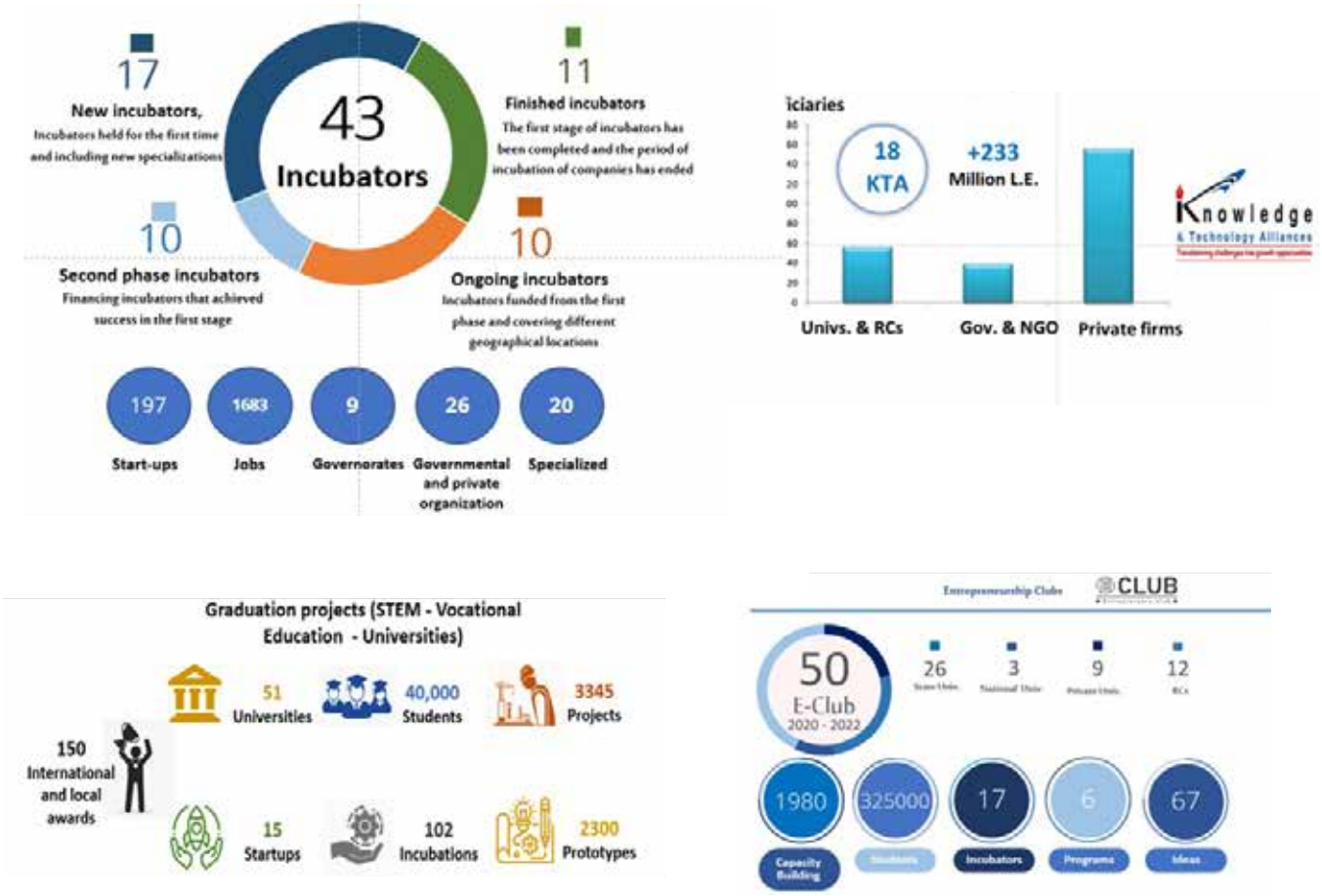


FIGURE (I - 43) : ASRT PROGRAMS GEARED TOWARD THE SUPPORT OF ACADEMIA-INDUSTRY RELATIONS

These mandates highlight ASRT's wide-ranging efforts in promoting scientific research, technological advancement, innovation, knowledge dissemination, social engagement, and the overall development of STI in Egypt.

Salient National Research, Development, and Innovation Projects

1- Reference Egyptian and Ancient Egyptian Genome Project

On March 1, 2021, President Abdel Fattah El-Sisi gave the greenlight for working on a project to assemble an Egyptian reference genome and establish a genome center. The project, the largest scientific undertaking ever attempted in Egypt's modern history, is expected to be completed by 2025 at an estimated cost of EGP 2 billion.

The project aims to establish the leading reference hub in the Middle East and Africa for the latest advancements in precision, personalized medicine, genetic healthcare, and gene therapy. This initiative employs highly advanced technology, qualified technical field experts, and empowers extensive national and international networks as per international quality standards. It has seven main strategic objectives including the establishment of the Egypt genome center; building a national scientific base; building an Egyptian genome reference; studying the genome of ancient Egyptians; studying common hereditary diseases in Egyptians; studying the whole exomes of some specific diseases; and studying the genome of elite Egyptian athletes.

FIGURE (I - 44) : EGYPT GENOME PROJECT

In a prompt response to the COVID-19 pandemic, the Academy of Scientific Research & Technology (ASRT) prepared and published a strategic study entitled: COVID and Post-COVID Priorities and Preparedness of Egypt STI (March 2020). One of the main recommendations of this study was the immediate necessity to establish the Egyptian Reference Genome to meet the future advancement in personalized and precision medicine. Approved by ASRT council no. 176, ASRT launched a competitive call for the "Egypt Genome" project, and a consortium, headed by Egypt Center for Research and Regenerative Medicine (ECRRM), won the grant.

The national consortium engaged in the implementation of the project consists of the ASRT, Ministry of Health and Population, Cairo University, Ain Shams University, Alexandria University, National Research Center, Mansoura University, National Museum of Egyptian Civilization, Nile University, Magdi Yacoub Heart Foundation, Shefaa Al Orman Hospital, Ministry of Communications and Information Technology, and the Ministry of Tourism and Antiquities

To date, project achievements include the collection of over 1,300 samples from the population with tests completed for more than 400 samples. Also, ancient DNA was extracted from 22 mummies and is currently under sequencing. Two fully automated bio-banks were designed, installed, and operated at a total cost of EGP 17,400,000 from the budget of the ECRRM. The Bio-Informatics Data Center was established as a separate data center with superior capabilities linked to the data center of the ASRT, maintaining all security measures for information and data control by the ASRT at a cost of EGP 61 million.

2- ASRT Regional Development Center for Renewable Energy

The center is the first, biggest, and only center for research/development and innovation (RDI) in renewable energy in the Middle East and Africa. It consists of up-to-date research facilities for RDI and semi-industrial (pilot production) of photo-voltaic (PV) and concentrating solar-thermal power (CSP) technologies. Among the central core facilities of the center are the Joint Egypt-China pilot plant for local manufacturing of PV in Sohag and the biggest CSP research and development station in a non-EU country in Borg al-Arab. The center has been successful in offering national vocational training and capacity-building programs to the Egyptian scientific community targeting the following areas of renewable energy:

FIGURE (I - 45) : ASRT REGIONAL DEVELOPMENT CENTER FOR RENEWABLE ENERGY

1. Development of innovative and sustainable energy sector components by utilizing experimental production (solar panels, desalination, cooling, and small solar concentrator units).
2. Smart gasification of municipal solid wastes using solar concentrator techniques rather than using fossil fuels.
3. Development of novel and economical applications of solar energy in various industries while offering technical support and guidance to the government, stakeholders, and those utilizing new and renewable energy sources.
4. Hand-on training of engineers, technicians, and researchers for human resources and capacity building.

The regional developed center of renewable energy has trained about 1000 undergraduates, engineers, chemists, and physicists in the field of renewable energy. Eight publications were published in international scientific journals, 10 master's and doctorate students received their degrees, and 33 poster and oral presentations were made.

The center consists of the following research units:

1- Egypt-China Joint Laboratory for RE

The joint laboratory is a platform for applied research in the development of solar cells suitable for local conditions, and it is the first in Egypt

and the Middle East to manufacture solar cells by local experts. Simply, all phases of solar panel manufacturing and testing are conducted now in Egypt as a result of ASRT efforts in international cooperation, technology transfer, and localization. The laboratory is equipped to produce solar cells and measure the performance of these cells and solar panels as well.

In addition to its research function, the facility is a model for the manufacture of silicon solar cells for the first time in Egypt and the Arab region and will therefore be a research and training center for this technology in Egypt, the Arab region and Africa. The laboratory produces single-blue silicon solar cells (15.6 x 15.6 cm) efficiently, up to 20%. Solar panels of 60 cells are also produced with a capacity of up to 250 watts. The entire plant is able to produce 600 solar cells for up to 8 hours a day with a total capacity of 700 kilowatts per year.

2- Multipurpose Applications by Thermodynamic Solar (MATS)

MATS was established within the framework of the joint cooperation of the Academy of Scientific and Technological Research and the European Union. The MATS Center was recognized for the operation, maintenance, and transfer of the technology of the multi-application station using solar energy at the Borg al-Arab Alexandria. The MATS project focuses on innovative solar technology based on molten salts as a heat transfer fluid.

It allows the combination of heat and power production from an integrated solar source with renewable energy sources, such as biomass, biogas, industrial waste, etc. through standard modules that provide high performance. It can be integrated with a reserve of biomass fuel, which adds flexibility to the system and enables the continuity of energy production. Producing one megawatt of electric power is the center's objective. A daily capacity of 250 m3 of water is desalinated using the remaining thermal energy.

3- Smart biomass power station

This project introduces fully automated smart technology using artificial intelligence for the purpose of sorting and classifying solid waste in order to benefit from solid household waste to produce synthetic gases, petrochemical products, fertilizers, and biochar.

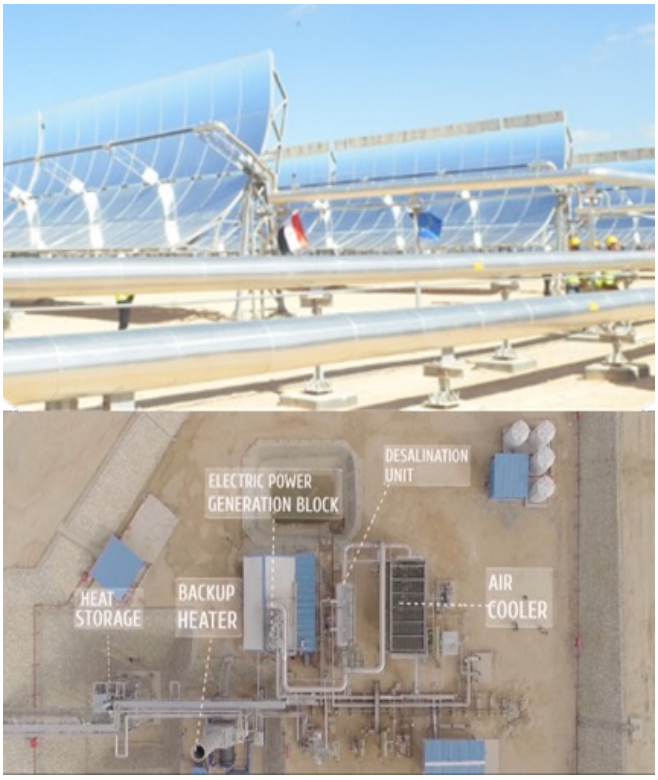


FIGURE (I - 46) : MATS PROJECT

Using technology transfer from the Chinese side, clean solar energy is relied upon to operate the reactor. The aims are to reduce greenhouse gas emissions when using gases resulting from the gasification process in power engines, in addition to replacing currently used fossil fuels with bio-fuels and utilizing by-products such as bio-char to increase soil fertility and crop productivity and maximize their added value.

4- Small Scale Thermal Solar district units for Mediterranean communities (STS-MED)

This plant is established at the SEKEM Community Development Farm in Belbeis Governorate of Sharkia. This power plant is the first multi-use solar power station in Egypt and in the Arab world, using Linear Fresnel Reflector (LFR) technology with a capacity of about 150 kW.

The STS-MED project aims to demonstrate the viability of small-scale solar concentrator systems in applications such as electricity production and air conditioning.

FIGURE (I - 47) : STS-MED PROJECT

ASRT will focus on contributing to advancements in the field of renewable energy and energy efficiency for a more sustainable and efficient future. The Regional Development Center for Renewable Energy aims to become an international center to enhance the efficiency and affordability of renewable energy technologies. This may include improvements in solar panels, wind turbines, energy storage systems, and other renewable energy solutions.

One landmark mega-project for renewable energy currently receiving funding is for green hydrogen production and storage technologies (HSTs). Green hydrogen is considered a centerpiece of the green transition, and it is a key energy carrier that will play a major role in reaching net zero CO2 emissions in the future. Furthermore, producing carbon credits through renewable energy centers will have additional advantages for both local and international communities.

C. Innovators Support Fund

The Innovators Support Fund (ISF) is an Egyptian fund aligned with global standards and supporting technological advancement to empower innovators, entrepreneurs, and talented students in crafting top class scientific and technological solutions. These solutions aim to tackle both market demands and societal issues, acting as a driving force for a knowledge-based economy. In 2017, President Abdel Fattah El-Sisi initiated a presidential decree tasking the MOHESR with establishing this fund. Its purpose is to sponsor innovators, researchers, entrepreneurs, and gifted students, fostering financial engagement from the public/private sectors and civil society as part of social responsibility endeavors. The fund, established under Law No. (1) of 2019, possesses a distinct legal identity and reports to the competent minister. Its primary objective is to ignite the potential of creative minds with analytical and innovative capabilities by applying knowledge and science. The headquarters of the fund are situated in Cairo governorate.

D. The Central Department of Missions

The Egyptian Central Department of Missions (CDM) operates as a central unit within the Sector of Culture Affairs and Scientific Missions (CASM) under the Ministry of Higher Education and Scientific Research (MOHESR). CDM comprises two primary functional units: Scientific Affairs and Financial Affairs. The Scientific Affairs Unit handles programmatic aspects, including the intake, selection, and processing of application documents for scholarships. It also assists in monitoring the academic progress of scholars and acts as a liaison between the Egyptian Cultural and Educational Bureaus (ECEB) and Egyptian universities. On the other hand, the Financial Affairs unit is responsible for ensuring the timely disbursement of approved expenses related to scholarships. This includes allowances, tuition fees, conference fees, and travel expenses, among others.

Previously, the CDM allocated scholarships to universities and research institutes to build their human capacity. However, since 1982, a new operational model has been implemented. Under this model, a 5-year dispatching plan is collaboratively developed in coordination with all stakeholders, including universities and research institutes. Each 5-year plan is designed with a specific overarching theme that aligns with national goals and priorities. Currently, the CDM is in the process of developing the 9th 5-year dispatching plan for the period of 2022-2027.

The following figure provides an overview of the main themes of the various 5-year scientific mission plans from 1982 to 2022.

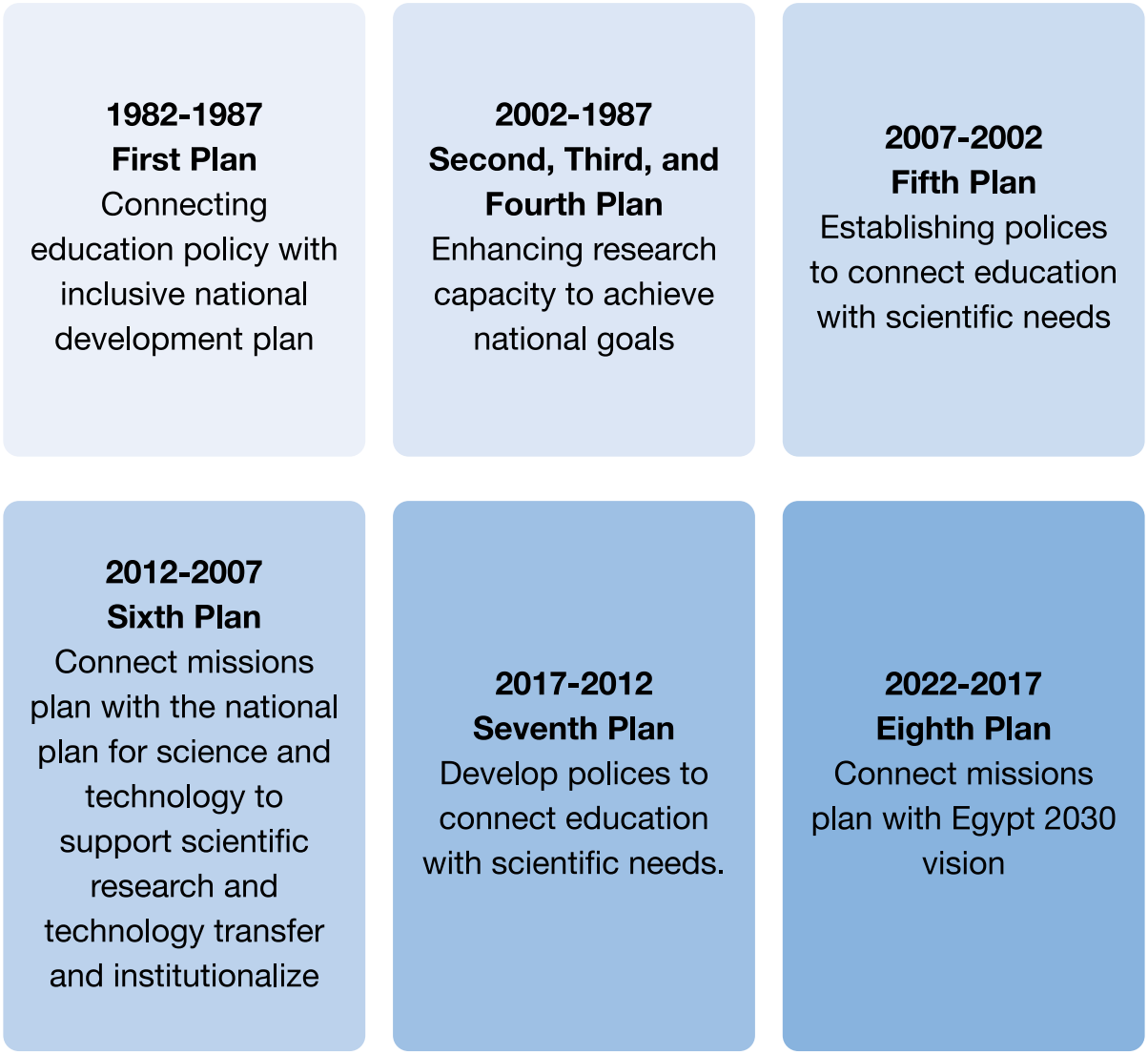


FIGURE (I - 48) : DEVELOPMENT OF 5-YEAR SCIENTIFIC MISSIONS FROM 1982-2022

Commencing from the 2020/2021 plan, the Central Department of Missions (CDM) has implemented an electronic system for scholarship applications. This system enables the announcement of scholarship opportunities twice a year, ensuring the selection of the most qualified candidates while ensuring transparency and fairness in the selection process. The launch of CDM's electronic platform took place on September 8, 2020. Under this new system, the entire scholarship application process, including application submission, reviewing, evaluation, personal interviews, and result preparation, is conducted electronically. This method has been consistently used for subsequent announcements as well. In accordance with CDM's Law No. 149 of 2020, the evaluation criteria for scholarship selection now includes a personality test to ensure the best candidates are chosen.

The scholarship announcement encompasses various types of dispatch as follows:

- **Fully funded PhD/MSc scholarships:** These scholarships cover the expenses for a complete doctoral or master's degree program, typically lasting between 2 to 4 years.
- **Joint-Supervision scholarships:** These scholarships facilitate research collaboration between two institutions and typically support scholars for a period of 1 to 2 years.
- **Post-doc scholarships:** These scholarships are awarded to individuals who have completed their doctoral studies and support their research work for up to 6 months.
- **Data collection:** A one-year grant in one of the Japanese universities, to collect scientific material for a master's degree registered at one of the Egyptian universities.

- **Executive program scholarships (Russia, China, Hungary):** These scholarships are specifically designed for executive programs offered by universities in Russia, China, and Hungary.
- **USAID GSP (Graduate Scholar Program):** This scholarship program, funded by the United States Agency for International Development (USAID), includes scholarships for MSc, Post-doc, and training opportunities.
- **External scholarships:** These scholarships are either self-funded or provided by external entities in the form of graduate teaching/research fellowships. They are primarily awarded for PhD programs, with some also available for MSc studies.

The following figure illustrates the current distribution of scholars studying abroad according to the type of scholarships they have been granted.

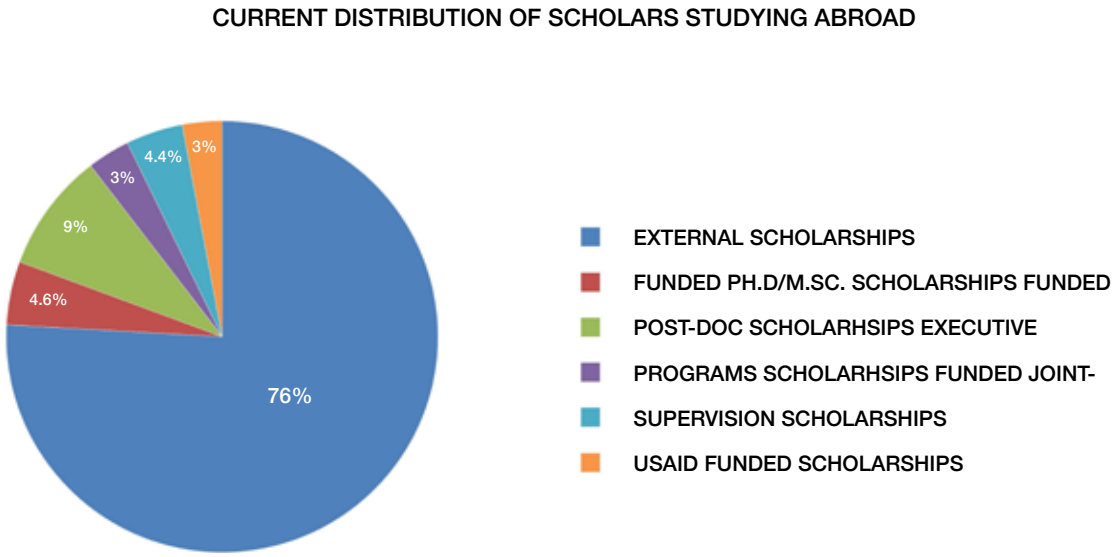


FIGURE (I - 49) : THE DISTRIBUTION OF RECENTLY GRANTED SCHOLARSHIPS IN 2020-2022 PER SECTOR.

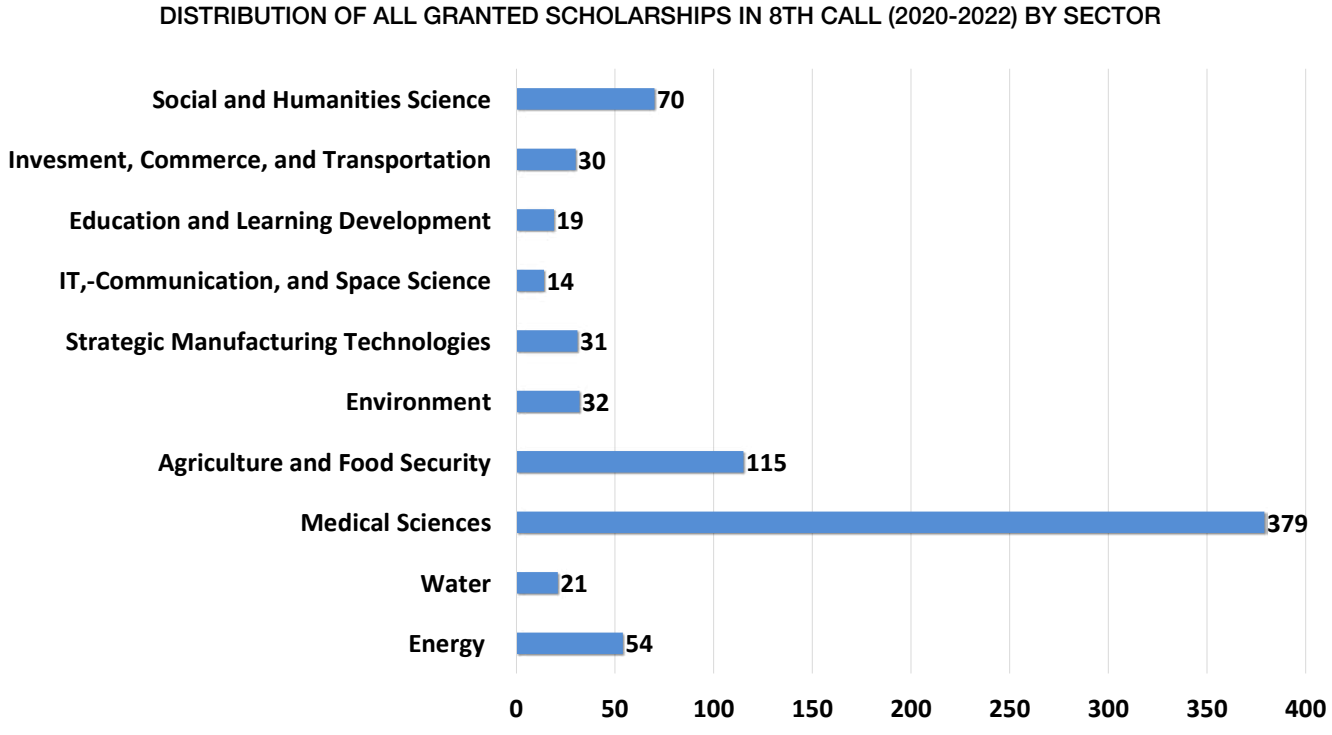


FIGURE (I - 50) : DISTRIBUTION OF ALL GRANTED SCHOLARSHIPS IN THE 8TH CALL (2020-2022) BY SECTOR

E. USAID MISSIONS PROGRAM

The US-Egypt Higher Education Initiative Assistance Agreement (USAID) represents an investment in Egypt's future by offering educational opportunities to highly accomplished individuals. These opportunities aim to equip them with the necessary skills to meet the demands of a modern 21st-century economy. In collaboration with the Government of Egypt and the private sector, USAID is actively involved in expanding access to higher education in Egypt and the United States. Moreover, strategic partnerships in crucial fields are being fostered to strengthen Egypt's economy.

The collaboration between the Central Department of Missions (CDM) and the USAID Missions Program is a partnership aimed at achieving mutual objectives and goals. Through this collaboration, both entities work together to implement various programs and initiatives that support the development of higher education and scientific research in Egypt. CDM was assigned the role of implementing one of the main USAID programs; namely, the Graduate Scholarships for Professionals (GSP) program. It consists of four dispatching types (figure below):

- MSc degree in the US
- MSc degree at AUC
- 6- month post-doc
- 3-4 months training course in the US.

The objective is to enable Egyptian professionals to pursue advanced academic studies at universities in the United States. This initiative facilitates the exchange of knowledge and expertise, ultimately contributing to the professional development of individuals and the overall advancement of Egypt's higher education system.

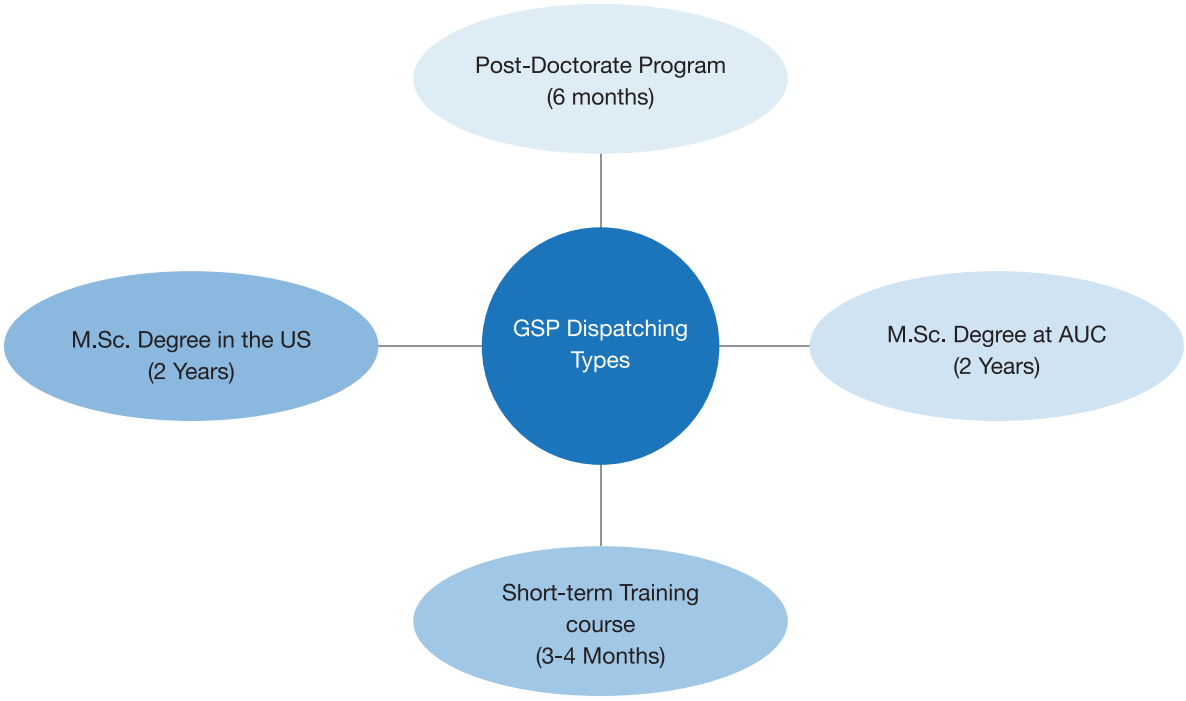


FIGURE (I - 51) : TYPES OF SCIENTIFIC DISPATCHING UNDER THE USAID GSP PROGRAM IMPLEMENTED BY CDM

USAID types of missions 2017-2021

- Up to a total of 130 post-doctoral students enrolled in 6-month post-doctoral program in the U.S. based on a fixed amount of $27,540 per student.
- Up to a total of 53 master's students enrolled in a two-year program in the US based on average annual tuition fees of $36,193 per student.
- Up to a total of 323 students enrolled in professional training in the U.S. based on a fixed amount of $31,913 per student.
- Up to a total of 15 master's students enrolled in a two-year program in a US- accredited educational institution in Egypt based on average annual tuition fees of $11,711 per student.

TABLE 3: NUMBER OF USAID GRANTS FOR DIFFERENT TYPES OF MISSIONS

TYPE	COHORT	COHORT-2	COHORT-3	COHORT-4	COHORT-5	TOTAL
	AUG-17	AUG-18	AUG-19	AUG-2020	AUG-21	
POST-DOC-U.S	34	28	29	20	19	130
MA-U.S	10	9	12	10	12	53
POST-GRAD-U.S	47	40	56	90	90	323
MA-EGYPT	4	6	3	2	-	15
TOTAL	95	83	100	122	121	521

TABLE 4: IMPLEMENTATION STATUS OF USAID GSP PROGRAMS DISTRIBUTED BY DISPATCHING TYPE

SCHOLARSHIP	TARGET SETTINGS	SELECTED	REJECTED	ACHIEVE THE PURPOSE	ACTIVE	REGISTERED IN THE SYSTEM	UNDER IMPLEMENTATION
6-MONTH U.S. SCIENTIFIC MISSION	130	152	27	58	10	4	53
INTERNSHIP IN THE UNITED STATES OF AMERICA FOR ONE SEMESTER FROM 3 MONTHS TO 4 MONTHS	464	354	77	104	9	9	201
** MASTERS IN THE USA	323	323	0	88	213	4	
MASTERS AT THE AMERICAN UNIVERSITY IN CAIRO	20		5		15		
TOTAL	937	829	109	250	247	17	254

F. EJEP MISSIONS PROGRAM

EJEP is an education partnership between Egypt and Japan to build a peaceful and prosperous society. The Human Resource Development Program aims to double the number of Egyptians studying in Japan. On the official visit to Japan by the President of Egypt in March 2016, the Prime Minister of Japan and the President of Egypt announced their partnership on education: Egypt-Japan Education Partnership (EJEP) to empower Egyptian youth, as an important component in their endeavors to combat terrorism and extremism and to enhance peace, stability, development, and prosperity.

This partnership has been realized based on the strong interest and commitment by Prime Minister Abe and President El-Sisi. The two leaders placed a high priority on cooperation around education including early childhood, basic, technical, and higher education, as well as scientific research, technology, and innovation. The two leaders committed themselves to the implementation of the policy measures incorporated in the agreed upon partnership. Under this partnership, the two governments announced that at least 2,500 Egyptians, in particular students, researchers, teachers, and government officials, especially in the fields of education and health, will be dispatched to Japan, thereby contributing to the realization of the Government of Egypt's development and reform plans as well as its efforts to empower its promising youth.

Based on the above background, JICA implemented research in March 2016, and formulated the Yen loan scholarship project named "Egypt-Japan Education Partnership: Human Resource Development Project." The objectives of the project are to promote human resource development through study and training opportunities in Japan mainly in the education and health sectors thereby contributing to the sustainable development, peace, and stability of Egypt.

Degree Programs:

- Doctoral degree (up to 4 years),
- Master's degree (up to 2 years) from a Japanese university.
- Joint supervision: A scholarship grant that provides the opportunity to receive guidance from a Japanese supervisor for a doctoral degree. (up to 1 year).
- Post-doctoral research: To conduct post-doctoral research. (Up to 6 months)
- Data collection for master's degree: A scholarship grant to conduct scientific research at a Japanese institution as part of postgraduate study. (Up to 1 year)
- Short-term exchange programs: For undergraduate students. Applicants must be in their 2nd or 3rd year and enrolled at an Egyptian university.
- Short-term Training Programs: Programs for professionals. Trainees learn and implement Japanese methods in their practical work in the fields of medicine, education, and administration.

The EJEP initiative consists of two main programs:

(1) Higher Education programs: This consists of both degree programs (PhD and MSc) and non-degree programs (1-month undergrad training, 1-semester/year undergrad study, joint-supervision, and postdoc programs).

(2) Training programs: This consists of a set of training programs oriented towards the Ministry of Education and the Ministry of Health and Population.

The following table summarizes the main targets and achievements of the EJEP program.

TABLE 5: IMPLEMENTATION STATUS OF THE EJEP INITIATIVE FOR THE VARIOUS DISPATCHING TYPES

PROGRAM			DISPATCHED	TOTAL TARGET	% DISPATCHED AGAINST TARGET
HIGHER EDUCATION PROGRAMS			425	540	79%
	DEGREE PROGRAMS	PHD	86	190	47%
		MA	4		
	NON-DEGREE PROGRAMS	1 MONTH	78	60	130%
		1 YEAR / SEMESTER	49	170	29%
		JOINT SUPERVISION	57	120	173%
		POST-DOC RESEARCH	151		
TRAINING PROGRAMS			260	965	27%
	EDUCATION	BE1 (MANAGEMENT)	21	220	10%
		BE2 (TOKKATSU)	81	220	37%
		BE3 (LESSON STUDY)	80	120	67%
		BE4 (KG)	0	120	0%
	HEALTH	H1 (NURSING MANAGEMENT)	21	40	53%
		H2 (HOSPITAL MANAGEMENT)	7	40	18%
		H3 (EMERGENCY CARE)	40	40	100%
		H4 (NURSING)	0	40	0%
		OJT	10	100	10%

Aside from these specific programs, an internal dispatching program for MSc and PhD students at the Egyptian-Japanese University for Science and Technology (E-JUST) is also being implemented by the CDM. This program dispatches staff members from all Egyptian public universities to earn their degree from the E-JUST as full-time graduate students. Currently, CDM is managing approximately 175 graduate students pursing their MSc and PhD degrees at E-JUST.

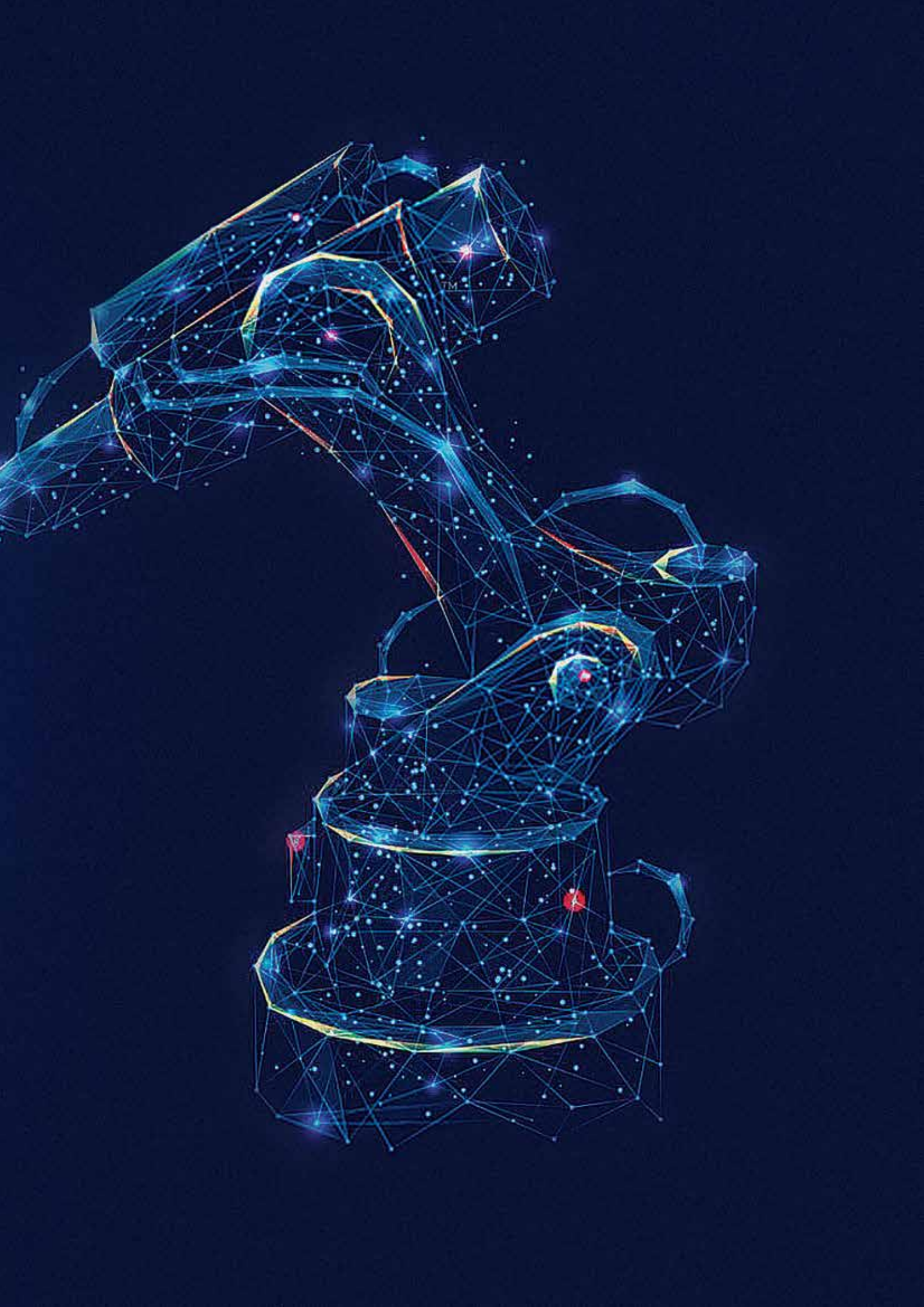
Arab Republic of Egypt

وزارة التعليم العالي والبحث العلمي

Ministry of Higher Education
& Scientific Research

I.V
THE COMMUNITY ENGAGEMENT TRACK

I. CURRENT STATUS



I.V.I CAREER DEVELOPMENT

The Egyptian Ministry of Higher Education and Scientific Research plays a pivotal role in fostering career development. Its vision is to enhance the educational journey of graduates, equipping them with the necessary skills to thrive in both national and international job markets that align with their educational background. To achieve this objective, the ministry focuses on **6 main pillars:**

1. Building contemporary programs that address the labor market by:
   - Supporting the establishment of interdisciplinary programs with curricula that support community service
   - Developing regional resources

2. Building skills and competencies for future jobs by:
   - Supporting competency building programs
   - Developing the outputs of educational programs to measure competencies
   - Supporting the Labor Market Observatory

3. Enhancing student career paths by:
   - The establishment of the Career Building Fund
   - The establishment and operation of employment centers
   - Career advising programs
   - Experiential learning programs

4. Supporting innovation and entrepreneurship by:
   - The work of the Geniuses and Innovators Welfare Fund
   - The establishment and operation of innovation centers
   - The activation of the Investment Incentives Law for the year 2018
   - Innovation and entrepreneurship programs at the level of the ministry and universities
   - The establishment of business incubators

5. Establishing educational institutions that offer a wide area of qualification for the labor market such as:
   - Public universities
   - National universities
   - Technological universities
   - Private universities

6. Linking scientific research to the labor market and the knowledge economy by:
   - Supporting the establishment of science and technology valleys
   - Supporting financing plans for projects related to the labor market
   - Supporting student graduation projects

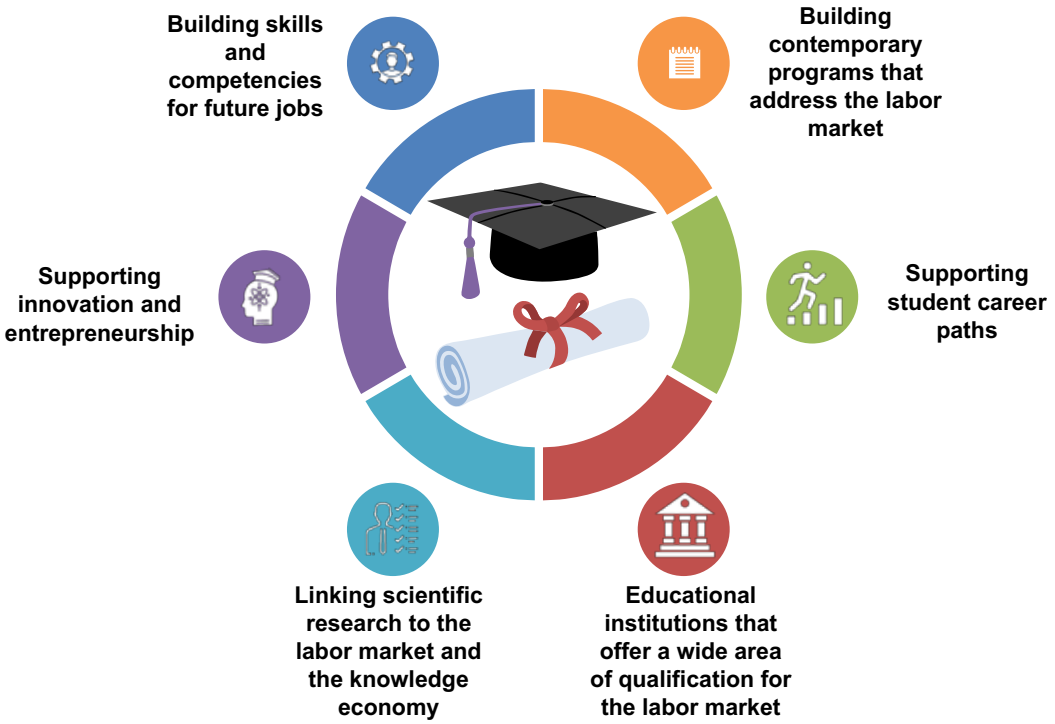


FIGURE (I - 52) : THE 6 MAIN PILLARS OF THE ROLE OF HIGHER EDUCATION IN CAREER DEVELOPMENT

Drawing upon the aforementioned pillars, the MOHESR introduced **five innovative concepts** to seamlessly integrate into students' educational journeys, enabling them to become future graduates well-equipped to meet market demands and thrive in the global arena. These concepts include:

A. **Building academic knowledge:** Strengthening students' academic foundations through comprehensive faculties and programs.
B. **Competency building:** Fostering skills development through specialized training units, employment centers, and innovation centers.
C. **Building innovation and entrepreneurship capabilities:** Nurturing innovation and entrepreneurial ability through dedicated innovation centers.
D. **Building technical skills:** Enhancing technical proficiency through integrated programs that bridge the gap between academia, labor market demands, faculties, and employment centers.
E. **Building professional skills:** Facilitating the acquisition of professional skills through tailored support from employment centers.

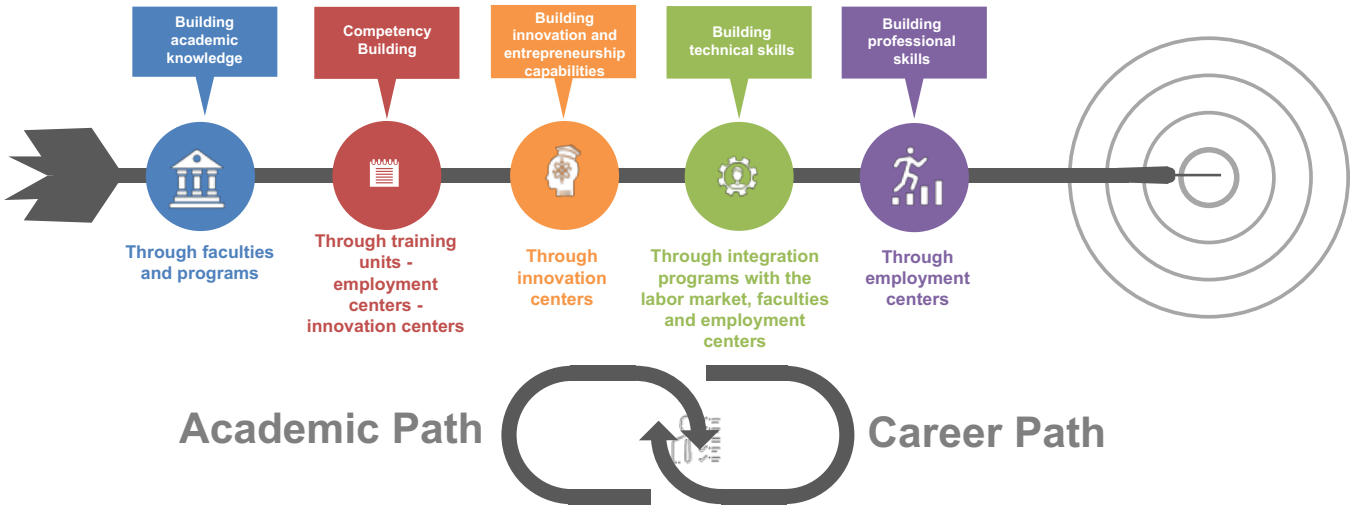


FIGURE (I - 53) : 5 NEW CONCEPTS TO BUILD A FUTURE GRADUATE

A. BUILDING ACADEMIC KNOWLEDGE

To implement these concepts, the ministry proposes a multifaceted approach to enhance higher education by aligning with the principles of fourth-generation universities. The plan encompasses the establishment of specialized programs and faculties in various regions, focusing on three primary categories:

- Community-oriented Curricula: These programs aim to cater to the needs of the community and serve society at large. They are not primarily influenced by resource constraints or spatial limitations, but rather focus on addressing societal challenges and providing valuable services.

- Globally Recognized Curricula: These programs emphasize excellence on a global level and specialize in emerging areas of study. They are not limited by resource availability or spatial considerations, but rather strive to achieve recognition and distinction on an international scale.

- Regional Resource Development Approaches: These programs are designed to leverage the available resources in each region, human or natural, to foster development. The specialization areas within these programs are tailored to align with the unique characteristics and nature of each region, thereby facilitating targeted regional growth and progress.

B. COMPETENCY BUILDING

Additionally, the ministry aims to foster student skills and competencies through specialized training units, employment centers, and innovation centers to equip students with necessary skills. Also, it advocates a strategy to empower universities and research centers in cultivating innovation and entrepreneurship skills.

The strategy seeks to identify gifted students, direct research towards commercializable solutions, support successful startups, and address societal gaps. Supporting subsidiary entities (ASRT, STDF, ISF) and internal units in universities and research centers helps implement various programs, including awareness, talent development, innovation support, technology incubation, commercialization, social entrepreneurship, startup incubation, and acceleration.

C. BUILDING INNOVATION AND ENTREPRENEURSHIP CAPABILITIES

To cultivate innovation and entrepreneurship skills among future graduates, the ministry has implemented a comprehensive strategy that empowers universities and research centers. This strategy encompasses the allocation of funds, provision of resources, and establishment of internal units dedicated to this purpose. The strategy aims to achieve the following objectives:

- Help identify, support, and develop gifted and talented undergraduates, who will later graduate and excel as they join the local and international market workforce.
- Direct its research and development efforts towards innovative solutions that can be commercialized in the market.
- Help initiate successful startups that can add to the country's economy.
- Generate innovative solutions that address society and community gaps and needs.

This overall strategy is implemented through the different programs and resources provided by the ministry's supporting subsidiary entities: the Academy of Scientific Research and Technology (ASRT), the Science and Technology Development Fund (STDF), and the Innovators Support Fund (ISF). Through these supporting subsidiary entities multiple internal units were created inside universities and research centers:

- Innovation Hubs & Entrepreneurship Centers
- Technology Incubators
- Business Incubators & Accelerators
- Training & Mentoring Centers
- Rapid Prototyping Labs & Workshops
- Research, Development, and Innovation Funds
- Startup Investment Funds

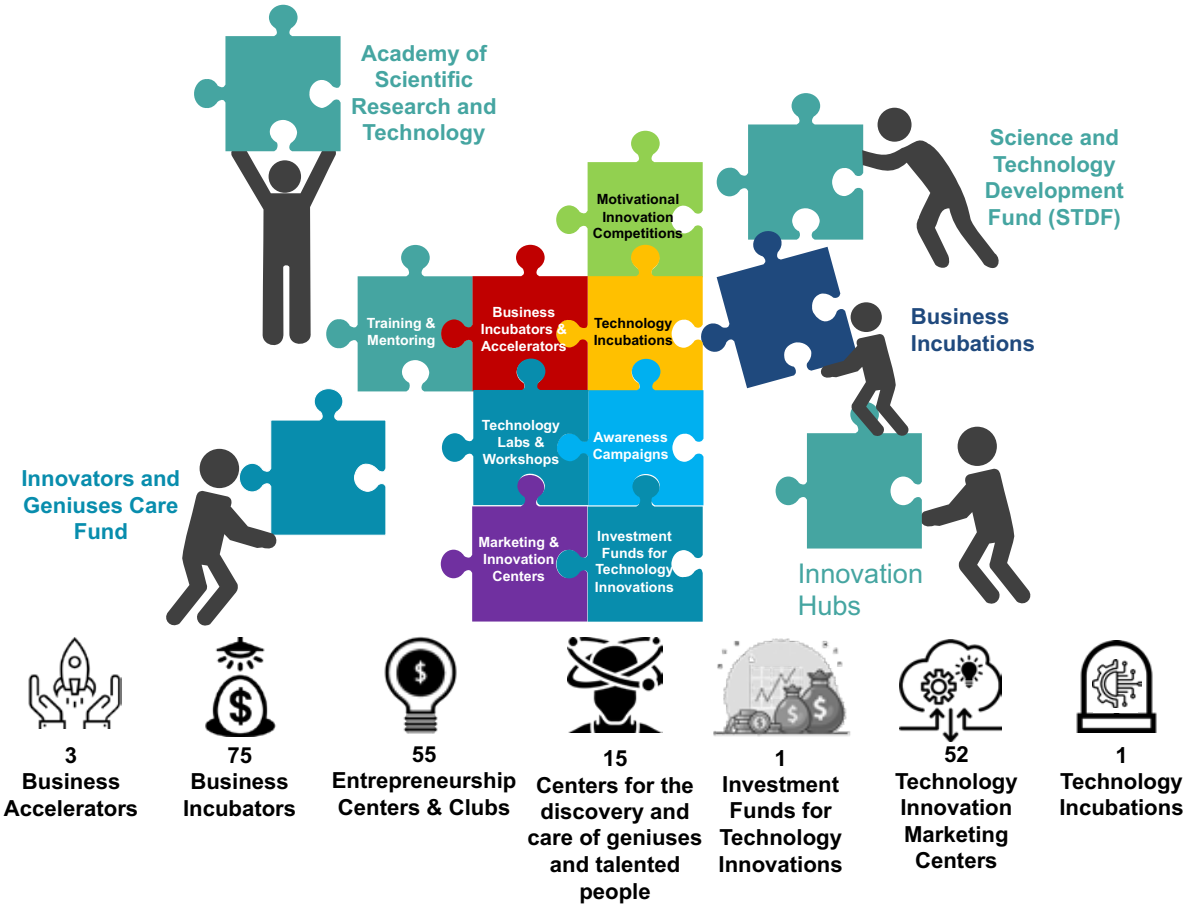


FIGURE (I - 54) : COMPONENTS OF THE INNOVATION AND ENTREPRENEURSHIP SYSTEM

These internal units help implement support programs that are centrally funded and monitored through the ASRT, STDF, and ISF. These programs, that work to create talented graduates, commercialized innovations, and innovative startups, can be summarized as:

- Awareness Programs
- Gifted & Talented Discovery Programs
- Gifted & Talented Development Programs
- Innovation Support Programs
- Technology Incubation Programs
- Technology Commercialization Programs
- Social Entrepreneurship Support Programs
- Startup Incubation Programs
- Startup Acceleration Programs

D. BUILDING TECHNICAL SKILLS

Building technical skills requires a comprehensive approach that connects academia, labor market demands, faculties, and employment centers. Integrated programs can play a crucial role in bridging the gap between these various stakeholders. some key goals are set to enhance technical proficiency:

- Curriculum alignment: Collaborate with industry experts and employers to align the academic curriculum with the skills and knowledge required in the labor market. Regularly review and update course content to ensure relevance and incorporate emerging technologies and industry trends.

- Practical learning opportunities: Provide hands-on, experiential learning opportunities that simulate real-world work environments. This can include internships, apprenticeships, cooperative education programs, or project-based assignments with industry partners. These experiences allow students to apply their theoretical knowledge in practical settings.

- Industry partnerships: Shape strong partnerships with local industries, employers, and professional associations. Engage industry representatives in curriculum development, guest lectures, workshops, and mentoring programs. Collaborate on research projects or joint initiatives to address industry challenges, fostering a symbiotic relationship between academia and the labor market.

- Career guidance and placement support: Establish robust career guidance services that help students navigate their career paths effectively. Provide counseling, workshops, and resources on job search strategies, resume writing, interview skills, and professional networking. Foster connections with employment centers or job placement agencies to facilitate students' transition from academia to the workforce.

E. BUILDING PROFESSIONAL SKILLS

Enhancing the professional skills of future graduates is sought by incorporating career support funds and establishing career centers within universities. These initiatives aim to integrate practical career development opportunities into the educational process.

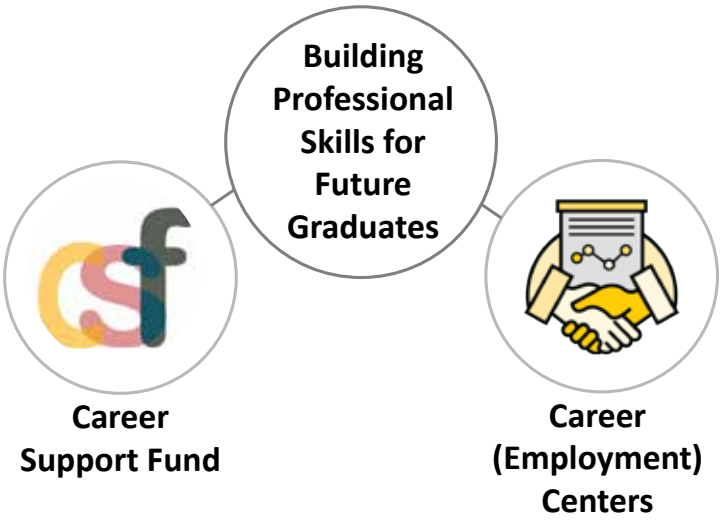


FIGURE (I - 55) : TWO AUTHORITIES RESPONSIBLE FOR BUILDING PROFESSIONAL SKILLS

E.1. CAREER SUPPORT FUND

The career support fund offers valuable resources for connecting academic paths with career paths, addressing market needs through the following measures:

- Professional Skills Development Programs and Experiential Learning: Implementing structured programs that focus on developing professional skills and providing experiential learning opportunities. These initiatives aim to prepare competent professionals by offering vocational guidance programs and internationally recognized certifications such as ICF-NCDA-TOT.

- Vocational Skills Platforms and Employment Departments: Establishing dedicated platforms and departments at both the ministry and university levels to facilitate vocational skills development and employment support. These platforms serve as a central hub for accessing resources, guidance, and job placement opportunities, enabling students to bridge the gap between their academic pursuits and the labor market.

- Labor Market Analysis Center: Setting up a reference data analysis center specifically designed to support the alignment of professional and academic pathways for university students. This center collects and analyzes data related to labor market trends, skill demands, and employment opportunities. The insights gained from this analysis inform academic programs and curriculum development, ensuring that students receive education that aligns with market needs.

E.2. CAREER (EMPLOYMENT) CENTERS

Each university in every region has established career centers that focus on creating a professional pathway aligned with the labor market, seamlessly connecting it with the academic journey. These centers aim to support and empower students in acquiring reputable, standout, and competitive job opportunities through the following approaches:

- Enhancing employability skills
- Cultivating life skills
- Experiential learning opportunities
- Career guidance services
- Internship and job opportunities
- Collaborations and partnerships
- Career events and employment fairs

FIGURE (I - 56) : THE ROLE OF CAREER CENTERS

E.3. CHALLENGES FACING CAREER DEVELOPMENT

The process of establishing a career path and connecting the academic journey to the labor market in Egyptian universities encounters numerous challenges across three distinct levels:

First: the level of establishing centers and describing their administrative entity

- There are challenges in establishing employment centers, whether by self-financing or through grants.
- There are no organized regulations that can be activated for all centers in public universities that guarantee continuity and ensure the provision of

services according to an international or unified reference, therefore there is no clear and approved administrative structure, and there is no salary category.

Second: the level of services and programs provided

- There is no fixed and original reference for providing career support programs.
- The lack of qualified cadres due to the lack of entities affiliated with the ministry supervising the interaction with students.
- Weak career management platforms or reliance on foreign platforms.
- There is no system for career guidance that integrates with academic guidance and helps develop courses linked to labor market needs.

Third: the level of building partnerships with the labor market

- Absence of an active role for the ministry and universities in an institutional manner to support relations and partnerships.
- Partnerships are based on individual capabilities, not on the institutional system.

E.4. GRANTS FOR THE ESTABLISHMENT OF UNIVERSITY CENTERS FOR CAREER DEVELOPMENT

There is a grant by the USAID for the establishment of career development centers at universities from 2017 to 2025 with the American University in Cairo as the implementing partner as they had the first experience of a university career center in Egypt in 1991 in collaboration with the International Labour Organization as the technical support partner. The objectives of this project are:

- Opening 20 centers in 12 universities followed by project expansion to include 30 centers in 20 universities in 2021.
- Improving employment opportunities for students and graduates of these universities through specialized training, career guidance and networking with the private sector.
- Strengthening relationships between universities and stakeholders from different fields.
- Establishing systems to analyze labor market patterns and follow up on participants' employment achievements. The technical support objectives for the project are as follows:
- Capacity building of 20 centers in 12 public universities.
- Building the capacity of the work team to collect, analyze and disseminate information on the labor market.
- Supporting university research, skills questionnaires and seminars with companies to collect quantitative and qualitative information on the skills required.
- Improving inclusive services for students with disabilities. Work is underway with USAID to expand the project to include 46 centers in 27 public universities, 4 private universities, and 3 technological universities. Several career centers already exist in some universities such as that of the American University in Cairo, the Employability and Career Development Center of Ain Shams University, and University Centers for Career Development at more than 11 University, and others.

FIGURE (I - 57) : EXAMPLES OF CAREER CENTERS AT SOME UNIVERSITIES

The existing career centers are divided into four categories:

- Centers supported by valid grants.
- Centers with grants that have ended.
- Centers with grants that have not been opened.
- Self-financing centers.

The figure below shows universities with existing career centers and those with no career centers yet.

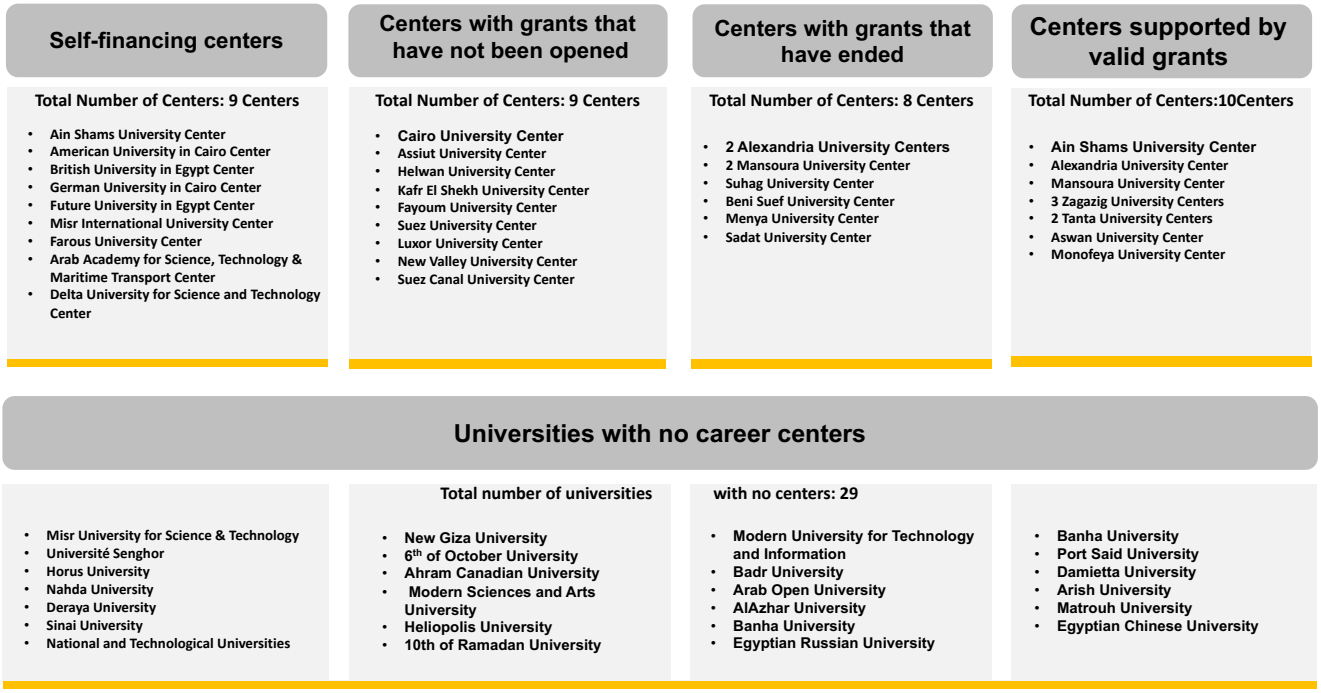


FIGURE (I - 58) : STATUS OF UNIVERSITY CAREER CENTERS

E.5. CAREER CENTER ACHIEVEMENTS

The number of centers affiliated with the project is currently 30 centers in 22 universities – 18 of which have been established in 11 universities. Their achievements include:

- 80,000 students trained in soft skills, specialized technical skills, and English language.
- 77,000 students attended workshops on job search skills, CV writing, personal interviews, and others.
- 50,000 students attended corporate and labor market introductory sessions.
- 3 employment forums were held in the presence of 7,000 students and graduates with the participation of 50 companies.
- 20,000 students attended one-on-one career counseling sessions.
- 30 agreements and memorandums of understanding were signed between the centers and private sector companies operating in the governorates.

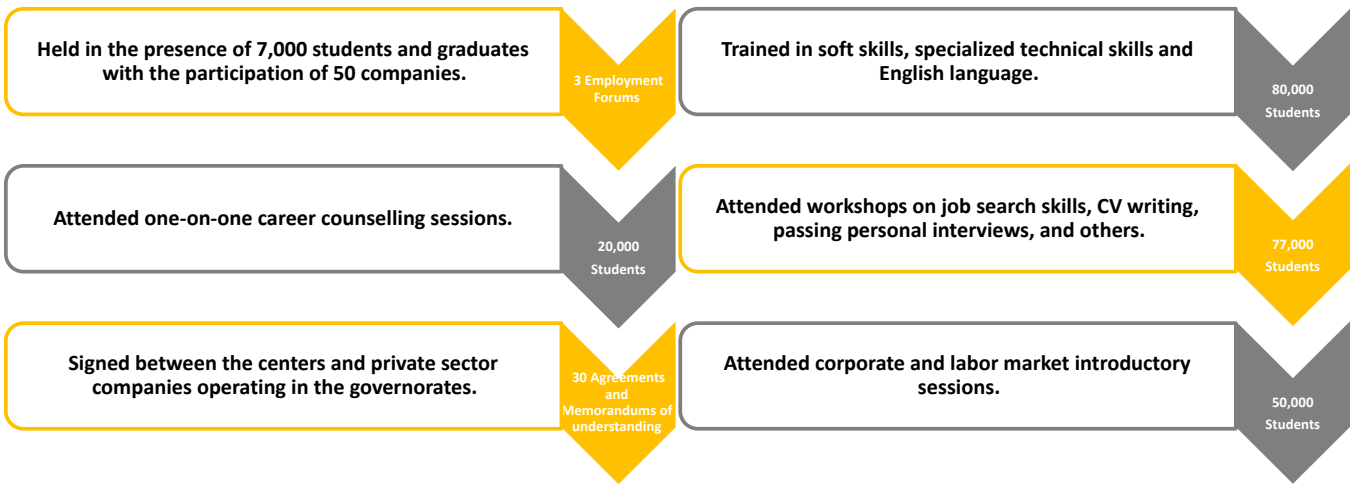


FIGURE (I - 59) : CAREER CENTER ACHIEVEMENTS

E.6. CAREER AND EMPLOYMENT SUPPORT FUND ROLE

The Career and Employment Support Fund plays a crucial role in addressing the challenges faced by career centers at universities and bridging the gap between these centers and the job market. This role encompasses three key levels:

First: the level of center establishment

- Supporting universities in establishing employment centers.
- Supporting universities in terms of regulatory and legal requirements for employment centers with international professional standards and support in developing administrative structures and defining salary categories for center employees.

Second: the level of services and programs

- Coordination with employment centers at universities in preparing and providing any functional education or learning programs through experience.
- Supporting employment centers in activating their role guiding the academic dimension to be more in line with labor market needs.
- Supporting the proper qualification of cadres subject to the supervision of the ministry.
- Using Vocational Education and Counseling Programs and Experiential Learning Programs.

Third: the level of building partnerships with the labor market

- Becoming the entity entrusted with dealing with career initiatives from any funding or other entity.
- Being authorized to contract for Ministry programs that link career paths to the labor market.

E.7. STRATEGIES FOR CAREER DEVELOPMENT

The ministry insists on having several strategies for career development and employability of future graduates by linking the educational path with the market through career centers. These strategies are:

- **Building programs and training systems** that develop cadres in partnership with international bodies and the private sector like the International Labor Organization and the USAID such as vocational education and counseling programs as well as experiential learning system.
  These programs will help qualify cadres with different qualifications as NCDA/ICF, ToT and IDLX, and this will empower students with the skills and experience to choose clear career paths.
- **Building a system of agreements** that allow communication and building partnerships with the private sector at the level of the ministry. These partnerships will be long-term partnerships to create employment opportunities, and as time passes, this will give career centers extensive experience in successful strategic partnerships.

FIGURE (I - 60) : EXAMPLES OF PARTNERSHIPS AND SUPPORTING ORGANIZATIONS

E.8. HIGH-PRIORITY PROJECTS

The most important projects being prepared and studied address the technological tools that serve the career path and employment such as:

- Establishing the interactive platform of the MOHESR for training and employment services at universities to link the ministry with public universities and track education outcomes and graduate employment.
- Establishing a platform for students to receive training and employment services at universities.
- Establishing a professional service management system for university employment centers and linking them to the ministry Career Service Management (CSM). Establishing a CSM for seven universities nominated by the MOHESR. These are projects being prepared and studied funded by the International Labor Organization and with the participation of one of the local startups supported by the organization. This will give the higher education process for career development two main edges: the Marketing & Communication edge which will help future graduates have a strong presence in the labor market; and the Information Center edge which will provide the process with labor market reports that will help maintain connectivity between the market and the educational institution.

I.V.II UNIVERSITY HOSPITALS

University hospitals aim at excellence in providing digital health and medical care in a manner consistent with sustainable technical governance and compatible with Egypt's Vision 2030 in a manner compatible with the latest medical and service methods locally and globally. They also focus on providing a safe digital medical service of high quality and at a satisfactory cost with a commitment to continuous development and improvement through digitized governance and the optimal use of available resources by qualified medical personnel with the aim of raising the level of quality health care. Based on the keenness of the Supreme Council of University Hospitals to improve the current situation and provide the best service to patients commensurate with this ancient institution, the development project has been approved, and we are in the process of implementing the steps and achieving the goals to provide the best diagnostic and therapeutic services to patients.

UNIVERSITY HOSPITAL DEVELOPMENT

University hospitals are an integral part of medical education, and their development is a key objective of the MOHESR In 2014, the ministry oversaw 88 university hospitals. By 2023, the number of university hospitals in Egypt had increased to 125. The development and enhancement of these hospitals required an investment of over EGP 9 billion.

The staff capacity of these university hospitals is substantial, with over 13,000 doctors, 5,578 dentists, 18,000 pharmacists, 1,516 physiotherapists, 6,000 nurses (nursing faculty graduates), and 12,000 nurses (qualified nursing institute graduates). Additionally, these facilities employ 31,250 faculty members, including professors, assistant professors, lecturers, assistant lecturers, teaching assistants, and resident doctors.

The MOHESR's commitment to the development and expansion of university hospitals ensures the availability and sustainability of high-quality medical education and healthcare services to meet the needs of the population. These hospitals serve as essential platforms for practical training, research, and the delivery of medical care in Egypt.

ZAGAZIG MANSOURA TANTA UNIVERSITY HOSPITALS			
ALEXANDRIA AIN SHAMS UNIVERSITIES HOSPITALS ONCOLOGY INSTITUTE			
CAIRO SUEZ BENHA UNIVERSITIES HOSPITALS			
HELWAN SUEZ CANAL BENI SUEF UNIVERSITIES HOSPITALS			
SOUTH VALLEY ASSIUT FAYOUM UNIVERSITIES HOSPITALS			
MENOFEYA KAFR ELSHEKH PORT SAID UNIVERSITIES HOSPITALS			
ASWAN SUHAG MENYA UNIVERSITIES HOSPITALS			

FIGURE (I - 61) : EXAMPLES OF UNIVERSITY HOSPITALS ACROSS REGIONS OF EGYPT

A. INFRASTRUCTURE

In 2023, the number of university hospitals in Egypt reached 125, with 73 hospitals provide multi-specialty medical services, 52 specialized hospitals in oncology, Psychiatry and addiction medicine, women's health, geriatric medicine, clinical toxicology, emergency medicine, gastroenterology and hepatology, pediatrics, ophthalmology, nephrology and urology, one day surgeries, obstetrics and gynecology, and cardiovascular and thoracic surgery.

The MOHESR's, in collaboration with the Supreme Council of University Hospitals, is striving to complete 160 projects for the renovation and modernization of university hospitals. This ambitious program includes the construction of 33 new hospitals, ranging from specialized to multi-specialty facilities. Additionally, the program encompasses 127 projects to enhance infrastructure and update medical equipment and devices in existing hospitals. This involved the implementation of advanced features like high end integrated modular operating rooms, equipping hospitals with the latest anesthesia machines and modern surgical tools, updating central sterilization systems, developing intensive care beds, and providing ventilators, dialysis machines, and incubators for premature infants, high end radiology equipment and Laboratory equipment. All these measures are being implemented at an estimated cost of about 19 billion Egyptian pounds.

Moreover, there is an ongoing initiative to obtain accreditation for university hospitals in the governorates of Suez, Aswan, Alexandria, Sohag, and Cairo from the General Authority of Healthcare Accreditation and Regulation (GAHAR). This aligns with the state's directive to expand the accreditation system across all governorates based on a specific timeline. These endeavors reflect a commitment to enhancing the quality and efficiency of university hospitals, expanding their services, and ensuring they meet international standards for patient safety.

FIGURE (I - 62) : INFRASTRUCTURE OF UNIVERSITY HOSPITALS

B. EQUIPMENT

University hospitals play a significant role in the healthcare sector, as evidenced by the following key statistics:

- **Clinical Capacity:** University hospitals have a combined capacity of 32,932 beds, accounting for approximately 30% of the total healthcare beds available in state owned governmental healthcare facilities. This substantial capacity allows for the provision of comprehensive medical services to a significant portion of the population.
- **Intensive Care Beds:** Among the clinical capacity, there are 4,830 intensive care beds available in university hospitals. These beds represent approximately 50% of the total intensive care beds in the government sector, highlighting the critical role played by the university hospitals in providing highly specialized and complex critical care services.
- **Incubators:** University hospitals also have 885 incubators, which are essential for providing specialized care to premature babies and newborns requiring advanced medical support.
- Additionally, the university hospitals are equipped with 15 linear accelerators, facilitating 110,000 radiation therapy treatments and 400,000 chemotherapy treatments annually. With 1,176 dialysis machines, including 136 specifically for pediatric patients, they perform approximately 1.7 million hemodialysis procedures each year. These

hospitals are unique in offering dialysis for children under 10 kilograms.

- Annually, around 40 million laboratory tests and 25 million radiological examinations are conducted in university hospitals, underscoring their significance in delivering comprehensive healthcare services. These tests contribute to the accuracy of diagnosis, as well as efficacy of treatment, and monitoring of various medical conditions, playing a vital role in patient care.

FIGURE (I - 63) : EQUIPMENT AT UNIVERSITY HOSPITALS

C. SERVICES

outpatient clinics of university hospitals catered to around 20 million patients per year and managed 3.5 million emergency situations annually. There was a significant rise in admissions, with about 2.7 million cases, up from 1.7 million in 2019. The university hospitals are equipped with 1,015 operating rooms, conducted over 1.5 million surgeries each year, encompassing 350,000 advanced and specialized procedures, including a lung transplant and 169 robotic surgeries, of which 40 were for children. Also, in our hospitals we offered 48,000 Coronary Angiography and 1,752 Intracranial Catheter Angiography. Furthermore, there are 54,000 interventional radiology procedures, and blood banks services with 500,000 donors and 6,600 plasma exchange sessions annually.

- Participation of university hospitals in the 100 million Health Initiative:
  The university healthcare system has implemented various measures to promote public health and address noncommunicable diseases. These include conducting a virus C survey and scan for noncommunicable diseases for patients in internal departments, covering approximately 2.7 million citizens. Additionally, university hospital workers, including administrators, doctors, and faculty members, undergo similar surveys and scans, amounting to around 300,000 individuals. Survey units have been established in university cities to facilitate comprehensive assessments, and new students joining public and private universities undergo virus C surveys and scans as part of their medical examination, with 319,989 students surveyed.

- Participation of university hospitals in implementing the presidential initiative for remote diagnosis (Telemedicine)
  The “Remote Diagnosis” initiative is one of the prominent presidential initiatives aimed at providing health consultations through remote medical diagnosis applications (Telemedicine). This is coordinated between the Ministries of Higher Education and Scientific Research, Health and Population, and Communications and Information Technology. Since its launch, it has contributed to diagnosing a large number of medical cases.

  The initiative helps improve the quality of healthcare services and utilizes technological solutions in treatment. It increases access to healthcare services for remote and border areas, easing the burden

on patients by saving them the trouble and effort of traveling to major hospitals, whether university hospitals or those affiliated with the Ministry of Health.

The university hospitals have conducted 54,000 remote medical consultations in various medical fields through this initiative in the last year.

- Participation of university hospitals in implementing the presidential initiative to support women's health and breast cancer detection:
  The presidential initiative for women's health, launched on July 1, 2019, operates under specific medical protocols across all cancer hospitals and centers overseen by the Supreme Council of University Hospitals. Breast cancer patients identified through this initiative receive care decided by multidisciplinary expert committees in each hospital. The initiative prioritizes regular screening and the effective treatment of diagnosed breast cancer cases in all affiliated hospitals and cancer centers. It aims to enhance the frequency of regular screenings and early diagnoses, ultimately leading to the full recovery of women afflicted with this disease. Within this initiative, 16 university hospitals participated, examining a total of 238,413 patients. Of these, 80,199 underwent advanced testing, and 6,107, who tested positive, started immediate treatment.

- Participation of university hospitals in President Abdel Fattah El-Sisi's initiative to end waiting lists for critical operations and urgent surgical interventions:
  It started on January 1, 2019, till now, university hospitals played a significant role in the presidential project, handling 375,692 out of 1,714,495 cases, our hospitals achieved an 80% completion rate, with 471,589 cases assigned to them. Notably, university hospitals outperformed other sectors in procedure completion, especially in handling complex cases that other sectors often couldn't manage. In various surgical specialties, their completion rates were impressive: 75% in oncology surgery (60,903 cases), 60% in orthopedic surgery (25,386 cases), 84% in ophthalmology surgery (121,735 cases), 71% in neurosurgery (47,210 cases), 70% in vascular surgery (7,691 cases), 64% in open heart surgery (26,227 cases), 95% in cochlear implant surgery (1,223 cases), 76% in liver transplants (785 cases), 76% in kidney transplants (469 cases), 83% in cerebral catheterization (4,940 cases), and 86% in cardiac catheterization (175,019 cases).

- The presidential initiative for early detection and treatment of cancers of the lungs, prostate, colon, and cervix
  It began its first phase on June 9, 2023. Eight university hospitals are engaged in this initiative, having examined a total of 4,018 patients. Of these, 1,126 underwent advanced investigations, and 8 were diagnosed as positive and began immediate treatment. University hospitals are also involved in training, workshops, and scientific days to discuss cases, events that are conducted regularly in all provinces. Currently, preparations are in progress for the second phase of the initiative, which is scheduled to commence in November with the participation of 10 university hospitals.

FIGURE (I - 64) : HEPATITIS C SURVEYS AND DETECTION CAMPAIGNS

D. MANPOWER

University hospitals possess expertise in various specialties and prioritize continuous development. The average number of personnel includes 32,500 individuals in roles such as professors, assistant professors, lecturers, assistant lecturers, teaching assistants, and resident doctors. The Ministry has made manpower investment a priority, implementing several initiatives:

- Training Programs: Seven second-level managers traveled to Japan for two months to receive training in hospital quality management. Ten others are currently completing their travel. Thirteen nurses have already completed a one-month training program in nursing management in Japan, while 10 more nurses are currently undergoing the same training. Fifteen doctors and 15 nurses have traveled to the University Hospital of Louisville in the USA for a two-week training program on infection control.

- Infection Control Training: A total of 5,461 medical staff, including 1,043 doctors, 2,925 nurses, and 1,493 laboratory technicians, have received training on infection control policies and methods at 14 universities.
- Emergency Department Training: Two thousand five hundred eleven workers in emergency departments at 19 universities have been trained on safe injection mechanisms.
- Financial Department Training: One hundred seventy employees in financial departments have undergone training on costing, program balancing, and performance programs.
- Supply Management Training: Thirty supply managers from 17 universities have received training in “Pharmacoeconomics.”
- Future Training Plans: There are preparations underway to train 40 pharmacists for three months on the health technology assessment system.

E. EDUCATION DEVELOPMENT

Initiatives were undertaken to enhance the medical education sector including:

- Establishment of the Egyptian Council for Health Specialties: The representation of Law 12 of 2022 led to the establishment of the Egyptian Council for Health Specialties. This council focuses on continuous professional development, ensuring that healthcare professionals stay updated with the latest advancements in their respective fields.
- Participation in the General Health Insurance Project: Efforts have been made to increase the number of students specializing in family medicine to align with the comprehensive health insurance system’s work strategy. Additionally, the training of medical college students in health units and centers has been initiated, providing them with practical experience. Furthermore, health economics studies have been included in the curricula of medical colleges, promoting a comprehensive understanding of healthcare management.

In addition, several actions were implemented to enhance medical education, including:

- Transition to the Credit Hours System: The academic system has been shifted from the traditional academic year model to the credit hours system. This change allows for a more flexible and comprehensive approach to learning and assessment.
- Internship program: The MOHESR executed the new internship program for general practitioners, dentists, nurses, and pharmacists. This step is crucial for the professional development of healthcare providers. This program typically involves practical, hands-on training in various healthcare settings, allowing interns to apply their theoretical knowledge in real-world situations under the supervision of experienced professionals.
- Emphasis on Clinical Training: The duration of theoretical study has been reduced, while the duration of clinical training has been increased. This shift ensures that students gain ample practical experience in real healthcare settings.
- Early Clinical Exposure: Students are exposed to clinical practice at an early stage of their education. This early exposure helps them develop practical skills, gain firsthand experience, and understand the clinical aspects of their field.
- Integration of Soft Skills: Curricula now include courses on communication skills, teamwork, patient interaction, and professional ethics. These additions ensure that students develop essential non-technical skills necessary for effective healthcare practice.
- Automated Evaluation System: An automated evaluation system has been implemented to ensure fairness, equity, and transparency in assessments. This system aligns assessment questions with the desired educational goals and ensures that these goals are translated into acquired knowledge and skills.

Arab Republic of Egypt

وزارة التعليم العالي والبحث العلمي

Ministry of Higher Education
& Scientific Research

I.VI THE MOHESR VISION

I. CURRENT STATUS

I.VI.I MINISTRY ASPIRATION FOR A NEW HIGHER EDUCATION SYSTEM

The MOHESR aims to reimagine the future of higher education and research in Egypt as a global hub for a thriving knowledge-based economy. It seeks to transform the higher education system into a globally competitive one that equips graduates with an entrepreneurial mindset, promotes technical and vocational training, focuses on outcomes, embraces innovation, and achieves financial sustainability. The key aspirations include:

- Entrepreneurial Mindset: Cultivating an entrepreneurial culture throughout the higher education system, fostering graduates who have the drive and skills to create jobs rather than solely seeking employment.
- Balanced Approach: Shifting the focus from traditional academic pathways to giving equal importance to technical and vocational training, meeting the demands of the labor market and supporting economic growth.
- Outcome-oriented Approach: Prioritizing outcomes and embracing technologies and innovations that enhance personalized learning experiences and address the needs of students.
- Regulatory Framework: Harmonizing the regulation of private and public institutions while transitioning from a highly centralized governance system to a model that grants earned autonomy within a regulatory framework.
- Financial Sustainability: Reducing reliance on government resources by encouraging all stakeholders benefiting from the higher education system to contribute financially, ensuring the system's long-term sustainability.

By pursuing these goals, the ministry envisions a higher education system that not only meets global standards but also empowers graduates to succeed in the global economy, drives innovation, and serves as a catalyst for social and economic development in Egypt.

I.VI.II KEY STEPS BY THE MINISTRY TOWARDS ACHIEVING ITS VISION

KEY STEP 1: IDENTIFYING THE SUSTAINABLE DEVELOPMENT GOALS (SDGS) OUTLINED IN EGYPT'S VISION 2030

To achieve the vision of the Ministry of Higher Education and Scientific Research (MOHESR) in Egypt, it is crucial to identify the Sustainable Development Goals (SDG) outlined in Egypt Vision 2030 and establish the connection between the characteristics of fourth-generation universities. By doing so, it becomes possible to formulate principles that will effectively support the MOHESR's vision. The SDG of Egypt Vision 2030 provide a comprehensive framework for sustainable development, encompassing areas such as education, innovation, economic growth, social inclusion, and environmental sustainability. These goals serve as a guide for aligning higher education strategies with the broader national agenda.

FIGURE (I - 65) : SDGS IN RELATION TO EGYPT'S VISION FOR COMPREHENSIVE DEVELOPMENT

KEY STEP 2: TRANSFORMING HIGHER EDUCATION INSTITUTIONS INTO FOURTH GENERATION UNIVERSITIES

Universities worldwide are increasingly recognizing the importance of embracing the concepts of the fourth generation as the future of the educational system. This global trend reflects a shift towards a more holistic and innovative approach to education. The fourth generation of universities emphasizes the integration of technology, interdisciplinary learning, research collaboration, entrepreneurship, and societal impact. By adopting these principles, universities aim to better prepare students for the challenges and opportunities of the 21st century, equipping them with the skills and knowledge needed. Furthermore, the fourth generation fosters a culture of innovation, encourages critical thinking, and promotes lifelong learning. As the global landscape continues to evolve, universities are aligning themselves with the fourth generation to ensure their relevance and impact in shaping the future of education.

Studying generations thoughts for universities

University concepts over the three generations

	1st Generation	2nd Generation	3rd Generation
Objective	Education	Education & research	Education, research & know-how exploitation
Role	Defending the truth	Discovering nature	Creating value
Method	Scholastic	Mono-disciplinary science	Inter-disciplinary science
Human capital development	Professionals	Professionals & scientists	Professionals, scientists & entrepreneurs
Orientation	Universal	National	Global
Language	Latin	National languages	English
Organization	Colleges	Faculties	Institutes & centers
Management	Rector & Chancellor	Part-time academics	Professional management

4th generation university concepts

	4th Generation
Objective	Education, open innovation (research)
Role	Enabling value creation
Method	Multi-actor innovation
Human capital development	Professionals, scientists entrepreneurs, artists, customers, ecosystemparticipants
Orientation	Ecosystem
Language	English
Organization	Innovation spaces
Management	Disruptors

FIGURE (I - 66) : DIFFERENCES BETWEEN EDUCATION GENERATIONS[1]

Looking at global trends for universities that highlight the characteristics of the fourth generation and its profound impact on the educational system, the key attributes of the fourth generation include dynamism, creating an environment that fosters creativity and critical thinking, attracting talented individuals, adopting an ecosystem-oriented approach, promoting interdisciplinary collaboration, and embracing connectivity. These characteristics reflect the evolving nature of education, emphasizing the importance of adaptability, innovation, and interconnectedness. By embracing these concepts, universities are poised to meet the evolving needs of students and effectively prepare them for the dynamic challenges of the modern world. Accordingly, universities can better equip students to address challenges and contribute to sustainable development.

1 Figure edited from: Lukovics, Miklós, and Bence Zuti. "Successful universities towards the improvement of regional competitiveness:'fourth generation'universities." Available at SSRN 3022717 (2017). and Steinbuch, Maarten, Tom Oomen, and Hans Vermeulen. "Motion control, mechatronics design, and Moore's law." IEEJ Journal of Industry Applications 11.2 (2022): 245-255.

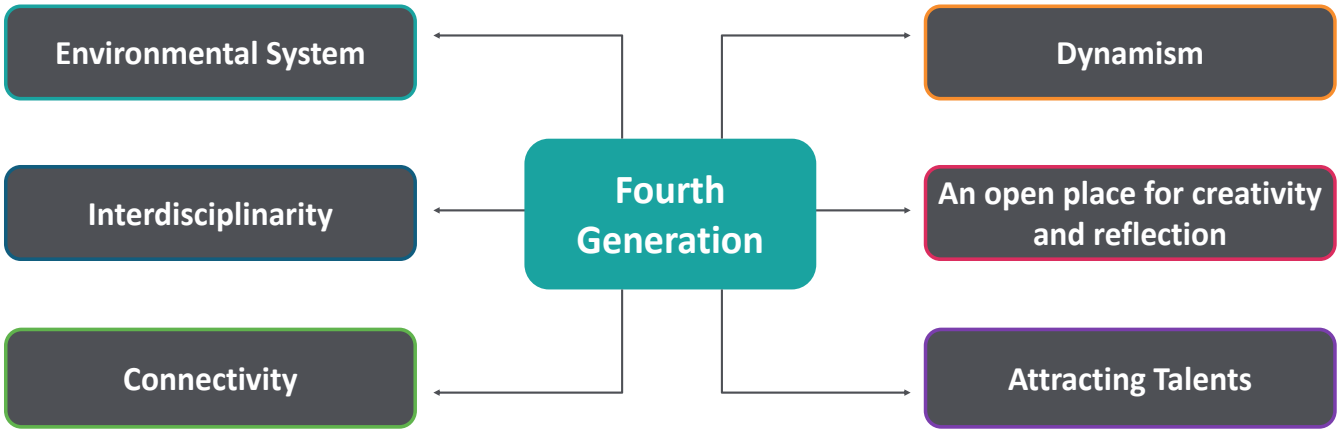


FIGURE (I - 68) : FOURTH-GENERATION CHARACTERISTICS

The educational process has evolved from the first generation of universities focusing solely on education, to the second generation incorporating scientific research, and then the third generation connecting education, scientific research, and the market. To activate the role of the Ministry of Higher Education and Scientific Research (MOHESR) in supporting development across economic, social, urban, and environmental sectors, it is crucial to align with fourth generation universities. This alignment revolves around linking education and research to the market, fostering scientific research, engaging in community services, promoting applied projects, and driving innovation.

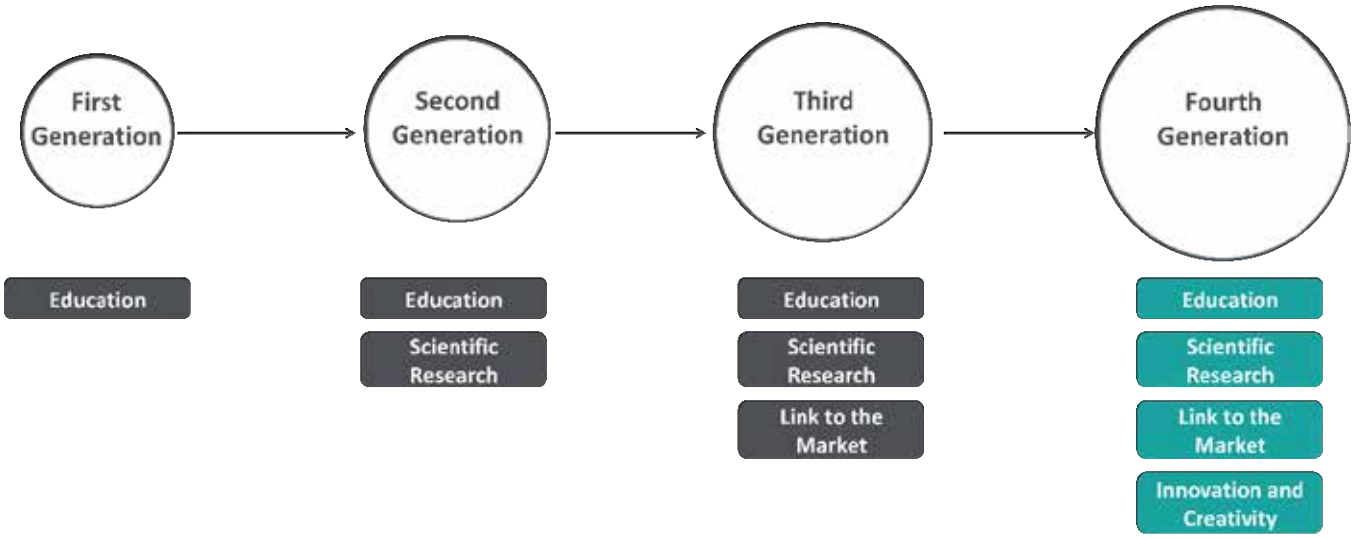


FIGURE (I - 67) : RISE OF UNIVERSITY GENERATIONS

By linking education to market needs, the MOHESR can ensure that graduates are equipped with the skills and knowledge necessary for the evolving job market. Emphasizing scientific research enables the generation of new knowledge, innovation, and solutions to address societal challenges. Active engagement in community services allows universities to contribute to local development, addressing the needs of surrounding communities. Promoting applied projects helps bridge the gap between theory and practice, resulting in practical solutions that drive economic and social progress. Finally, fostering innovation encourages an entrepreneurial mindset and the commercialization of research outputs, promoting economic growth and technological advancement. By identifying and pursuing these goals, the MOHESR can effectively contribute to sustainable development, supporting Egypt's overall strategic vision.

FIGURE (I - 69) : THE ROLE OF THE MOHESR

KEY STEP 3: ADOPTING A COMPREHENSIVE APPROACH TOWARDS ECONOMIC DEVELOPMENT VIA HIGHER EDUCATION

Identifying the predominant economic activities in various regions of Egypt is crucial for adopting a comprehensive approach towards development. This serves as a vital determinant, shaping the principles that guide the higher education institutions in the country. By recognizing the diverse economic landscape and the specific industries and sectors prevalent in each region, universities can tailor their programs, research initiatives, and collaborations to align with the local economic needs. This approach ensures that higher education institutions contribute effectively to economic development, innovation, and the overall progress of Egypt's different regions.

FIGURE (I - 70) : DIFFERENT REGIONS AND ECONOMIC ACTIVITIES ACROSS EGYPT

I.VI.III SHAPING THE FUTURE: UNVEILING THE 7 PRINCIPLES FOR ADVANCING HIGHER EDUCATION AND SCIENTIFIC RESEARCH IN EGYPT

Based on the aforementioned key steps, seven principles were formulated to align with the Ministry's vision of advancing the higher education process and creating enhanced opportunities for future graduates both within Egypt and on an international scale. By identifying the SDGs and aligning them with the characteristics of fourth-generation universities, it becomes possible to develop seven principles that will guide the MOHESR's efforts. These principles serve as guiding pillars that shape the direction and goals of the ministry's initiatives.

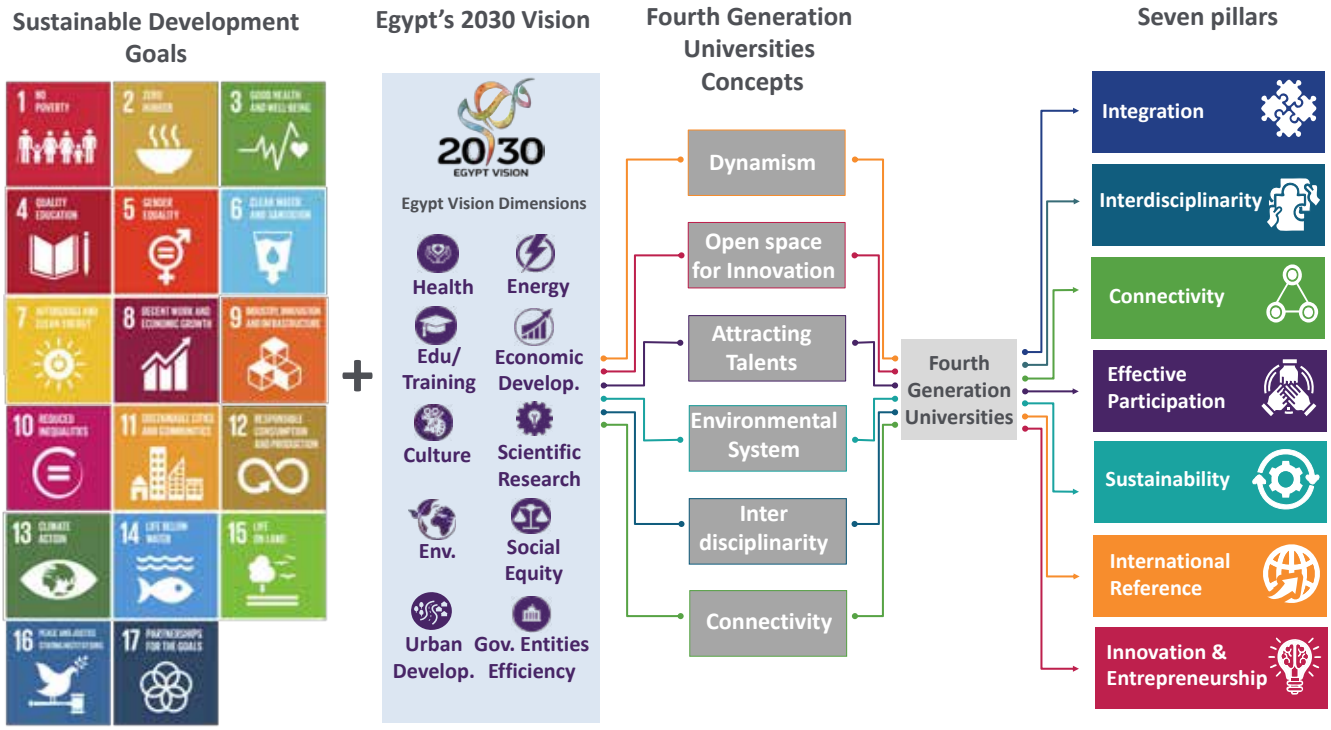


FIGURE (I - 71) : THE SDGS AND THEIR RELATION TO FOURTH-GENERATION UNIVERSITIES

The 7 seven principles seek to achieve the following:

- **<u>Integration between educational institutions and geographical regions through:</u>**
- Establishing regional alliances of educational institutions to achieve integration.
- Integration of academic programs with local and international development needs through interdisciplinary programs.
- Linking graduate skills to the international and local labor market.

- **<u>Strong presence at the international level and the promotion of investments in the field of education through:</u>**
- Strengthening international cooperation & building a competitive international reference.
- Activating the role of educational institutions to participate effectively in the labor market through an investment perspective.
- Stimulating a sustainable environment for educational institutions through investment in educational institutions.

- **<u>Activating the role of higher education institutions and scientific research in supporting the path of innovation and entrepreneurship through:</u>**
- Supporting scientific research towards innovation.
- Establishing business incubators and innovation centers.
- Supporting entrepreneurship and integrating it into different programs.

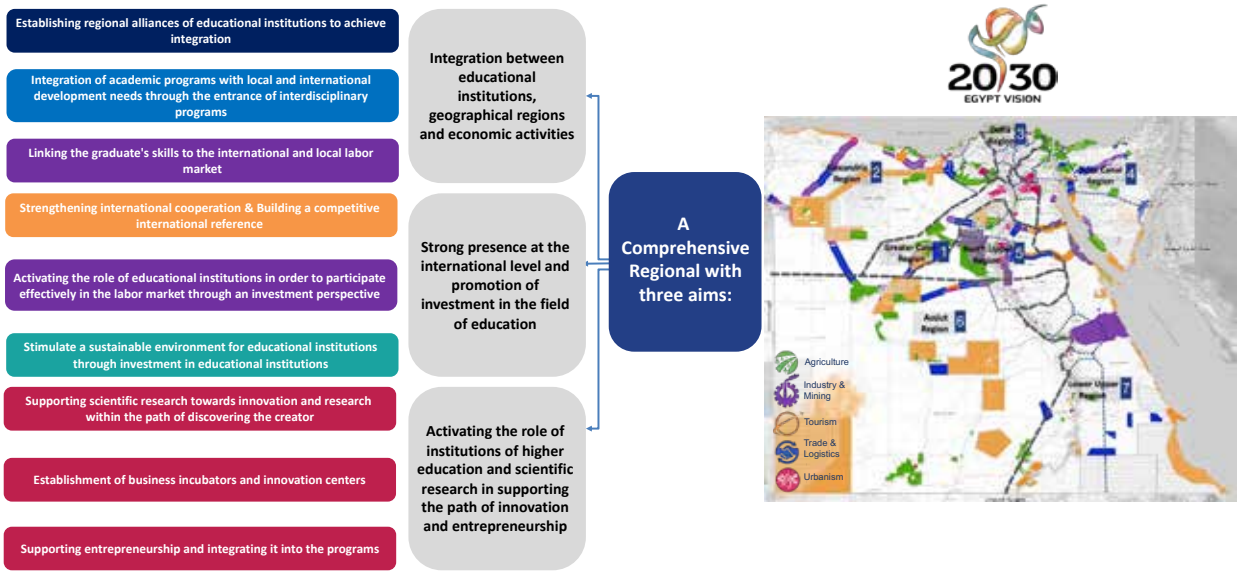


FIGURE (I - 72) : THE COMPREHENSIVE APPROACH TO DEVELOPING THE HIGHER EDUCATION PROCESS

Based on the seven principles, the ministry is identifying missions that seamlessly integrate with the characteristics of 4th generation universities. These missions addressed program portfolios that embody values of innovation, collaboration, and engagement. Through these portfolios, students are offered to participate in experiential learning opportunities, study abroad, participate in international internships, and partnerships. Thus, mobility and exchange initiatives are prioritized, which are facilitated by cultural exchange offices and scientific missions.

Moreover, the program portfolio is designed to actively promote community and market engagement. This necessitates connectivity at both internal and external levels. The Internal level involves collaboration among various Higher Education Institutions (HEIs) and research centers across Egypt, fostering not only physical connectivity but also connections within market sectors and regions. Besides, external level focus on establishing effective communication channels and forming relationships with international partners. In line with these objectives, the ministry places significant emphasis on the transfer of knowledge and technology for promoting innovation and driving socio-economic development.

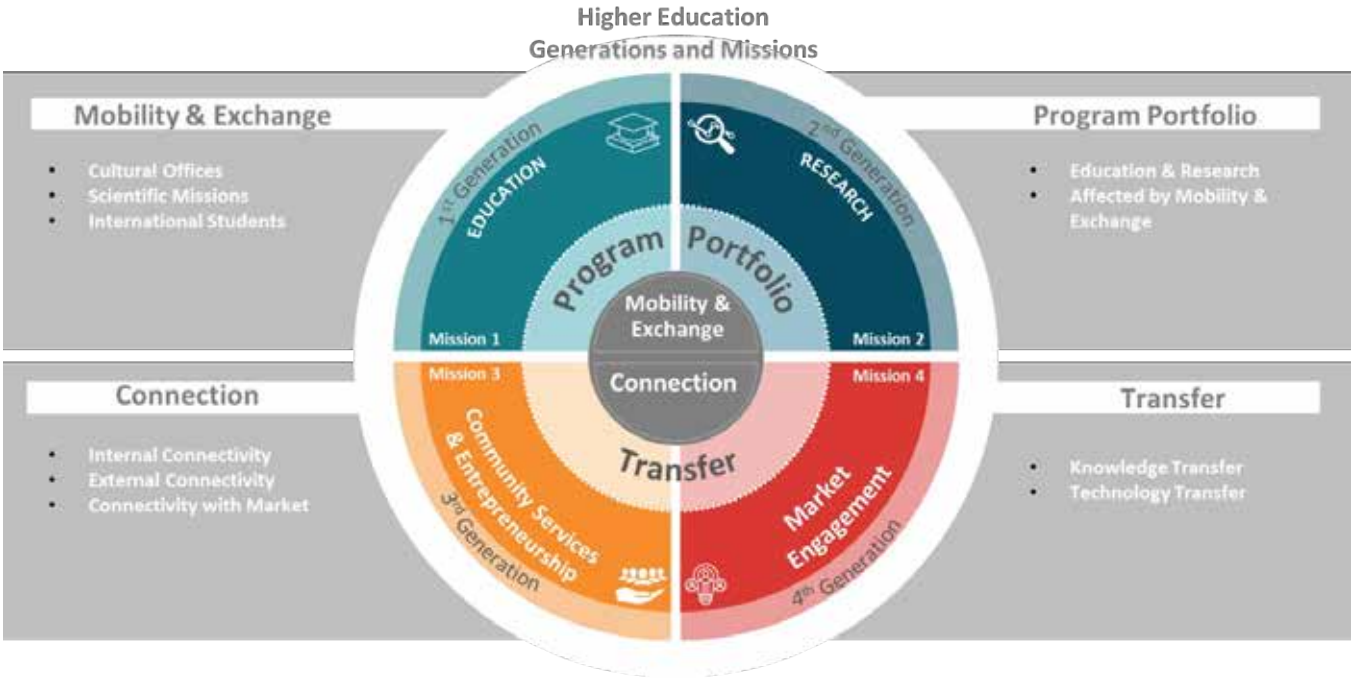


FIGURE (I - 73) : HIGHER EDUCATION GENERATIONS AND MISSIONS

To achieve the 4th generation program portfolio, both universities and faculties, as well as innovation and career centers are integral components essential for attaining the strategic vision outlined by the ministry. These centers serve as incubators of technical skills, effectively offering ways to global market participation. These centers are supported by funding agencies to ensure their sustainability in fostering growth. Such support also facilitates the development of new partnerships.

FIGURE (I - 74) : FOURTH- GENERATION PROGRAM PORTFOLIO

The subsequent chapters will delve into each of these principles, exploring their significance and providing comprehensive insights into their implementation. Through an in-depth examination of these principles, the Ministry aims to foster a more developed higher education system that equips graduates with the necessary skills, knowledge, and opportunities to thrive in their future careers, contributing to our knowledge-based economy.

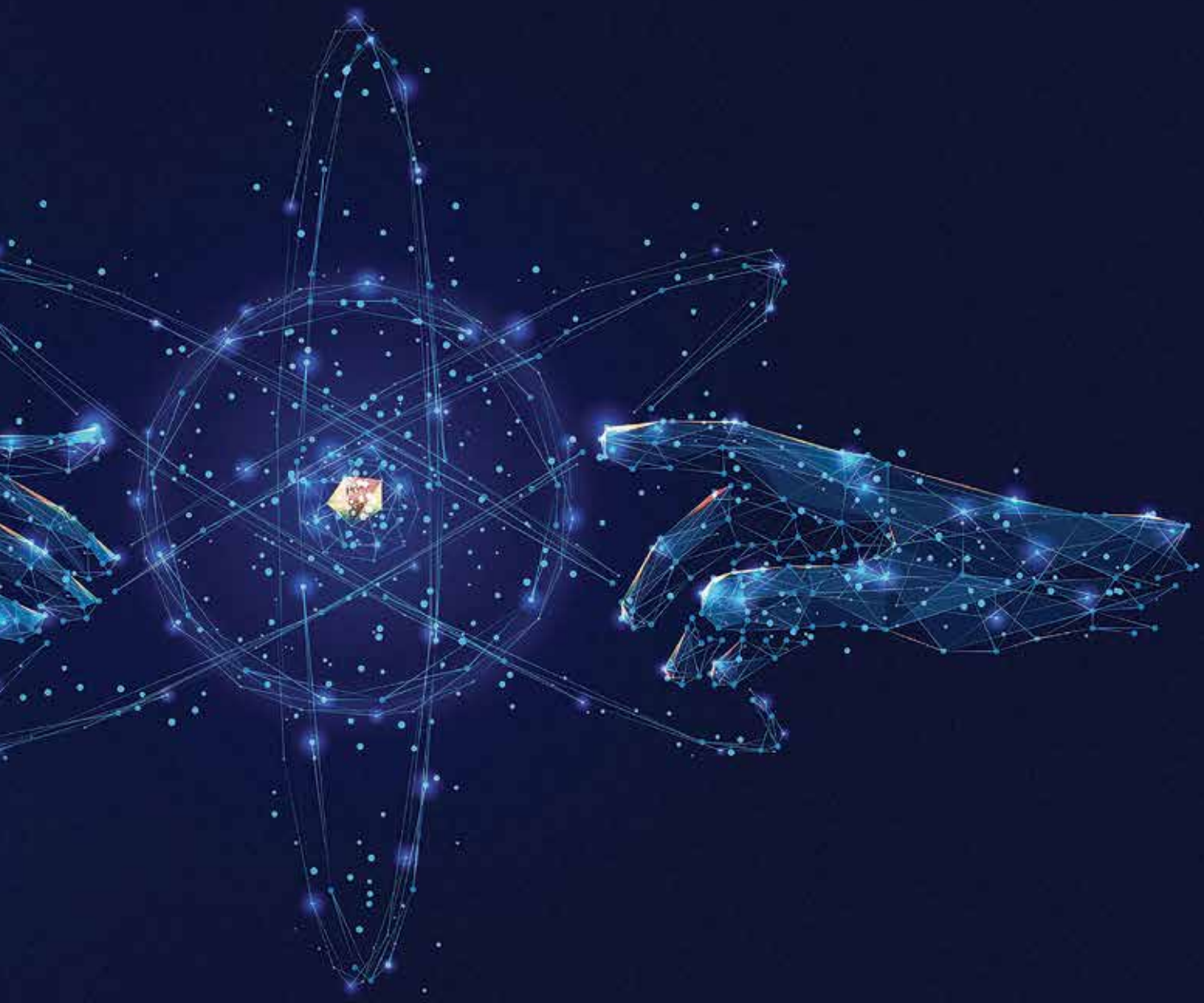
FIGURE (I - 75) : THE 7 PRINCIPLES DESIGNED TO TAKE EDUCATION IN EGYPT TO THE FOURTH GENERATION

Arab Republic of Egypt

وزارة التعليم العالي والبحث العلمي

Ministry of Higher Education
& Scientific Research

1.
INTEGRATION



1.1 INTRODUCTION

Integration is one of the seven pillars upon which higher education is based. Higher education can be both a public and private benefit that reflects the progress and development of all other economic sectors. At the same time, integration can help the state unify its policy in the field of education, meet international educational standards, support accreditation and licensing of higher education institutions in different geographical regions, and ensure high-quality education. Integration ensures the achievement of the goals of the 2030 vision of the Ministry of Higher Education and Scientific Research (MOHESR) and improves the network of higher educational institutions by merging their goals and creating coherence between them.

Integration between scientific research in educational institutions and the market opens the way for enhancing and developing curricula and programs to fulfill market needs. This concept depends on the creation of integrated regional entities that aim to achieve the maximum benefit and to exchange human resources and experiences in order to maximize services within different regions and various areas of development. This concept ensures efficient interaction between the labor market and academia and enhances employability, job opportunities, and production levels.

Integration happens on two main levels: the national and the international. Engaging both levels helps the education development process fulfill the anticipated vision. National integration requires more interaction across higher education institutions and between the sectors that comprise the economy. Moreover, it requires a policy for strengthening mutual understanding between institutions and preserving cultural influences and areas of education most in need for different regions. This integration can eventually lead to more smart governorates, where all educational institutions are connected in a smart centralized way to make the best out of available resources for all students from different institutions.

Integration on the international level enables educational institutions to satisfy international market needs according to the Sustainable Development Goals (SDGs). This helps enhance graduate proficiency in fulfilling international parameters and developing international competencies.

1.2 NATIONAL INTEGRATION

National integration involves integrating different educational institutions and economic activities within each region across Egypt by creating regional consortiums to fulfill the market needs in each region.

1.2.1 Egypt's Seven Regions

To further comprehend national integration, it is important to first understand the different regions across Egypt, their economic activities, and the educational institutions available within them.

There are seven regions in Egypt:

1. **Greater Cairo** is the largest metropolitan area in Egypt, the largest urban area in Africa, the Middle East, and the Arab world, and the 6th largest metropolitan area in the world. It consists of all cities in Cairo Governorate as well as the cities of Giza, 6th of October, and Sheikh Zayed in Giza Governorate and Shubra El Kheima and Obour in Qalyubia Governorate.

2. **Alexandria** is located on the southern coast of the Mediterranean, in the far West Nile delta area.

3. **Delta** is the area formed in Lower Egypt where the Nile River spreads out and drains into the Mediterranean Sea. It is one of the world's largest river deltas. It includes governorates such as Beheira, Gharbia, and Dakahlia and is known for its fertile agricultural lands.

4. **Suez Canal** is a region located in the northeastern part of Egypt and encompasses the area around the Suez Canal, a vital international waterway connecting the Mediterranean Sea to the Red Sea. It includes cities such as Port Said, Ismailia, and Suez, and is strategically important for international trade.

5. **North Upper Egypt** generally refers to the northern part of Upper Egypt, which is the Nile River Valley area to the south of Greater Cairo. It includes governorates such as Minya, Beni Suef, and Fayoum and is known for its historical sites, ancient temples, and traditional rural life.

6. **Assiut** is known for its cultural and historical significance. It has served as an important center for trade, education, and religious activities and comprises several educational institutions, including Assiut University, one of the largest universities in Egypt.

7. **South Upper Egypt** refers to the southern part of the Nile River Valley, including governorates such as Luxor, Aswan, and Sohag. This region is renowned for its ancient temples, archaeological sites, and the natural beauty of the Nile River.

Each region in Egypt possesses unique economic and social attributes that set it apart from others including diverse economic activities that may not be found in other areas. Each region has its own set of industries, resources, and strengths, contributing to its distinct economic landscape. This diversity fosters specialization and allows for the development of a well-rounded economy across the country. Consequently, each region embodies a variety of public, national, private, and technological universities, as well as research centers. These educational and research institutions should align with the specific needs and requirements of their respective regions.

1.2.2 The Economic Dimension

Each region is well known for certain economic activities that add to the Egyptian economy. These activities can be in one or more economic sectors such as agriculture, industry, mining, trade and logistical services, tourism, and construction. Regional variations in economic activities influence development, productivity, trade patterns, and regional disparities and can be attributed to different factors such as geography, location, resources, and infrastructure. This is known as the "Geographical Economy", which is the phenomenon of grouping economic sectors into specific blocks. It considers the interactions between economic activities and the physical and human characteristics of different regions.

The idea of integration is based on how educational institutions are used to serve the geographical regions, taking into consideration the distribution of the economic sectors over these regions, in a way that unifies them. Meanwhile, integration requires an alliance between all entities affiliated with higher education and those in charge of implementing development plans with the aim of understanding the educational needs in each region and the disciplines missing to serve and develop the region from both educational and economic perspectives.

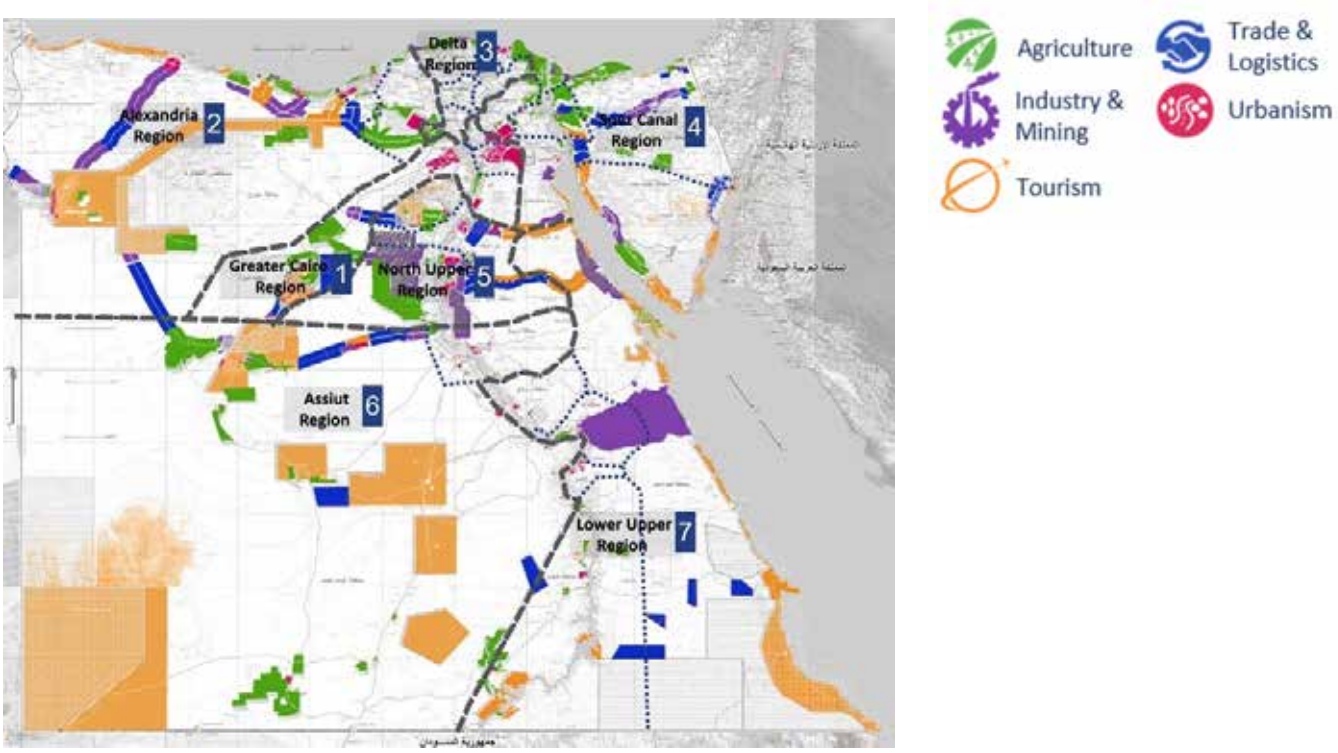


FIGURE (1 - 1) : EGYPT'S MAP SHOWING ECONOMIC ACTIVITIES

There are five main economic activities across Egypt:

- Agriculture
- Industry and Mining
- Tourism
- Trade and Logistics
- Urbanism

Within each region, there should be an integrated consortium that addresses the economic dimension and future employment needs associated with the activities in each region. For example, the golden triangle project is one of the most important national projects that serve the southern region of Egypt. The project is located in the Eastern Desert, on an area of more than 2.2 million acres, between Qena, Safaga, and al Qusayr. It includes industrial, mining, tourism, agricultural and commercial areas designed to contribute to the development of Upper Egypt, encourage investment, and open new markets for industry and mining, agriculture, trade and logistics, urbanism, and tourism. The regional consortium can then address these economic activities and contribute to achieving Egypt's sustainable development vision.

1.2.3 The Academic Dimension

The next step is to align the role of educational institutions with economic needs and develop academic programs that serve the economic activities in each region. New programs are established to bridge the gap between the existing programs in higher education and actual regional needs with the aim of improving the entire system. Thus, regional consortiums link educational institutes in each region with economic activities and include public, private, national, technological, and community universities.

The presence of different universities, research centers, and economic activities in each region reflects the rich and diverse fabric of Egypt. The focus on leveraging

Greater Cairo Region

Educational Institutions	2023	2052
Public Universities	4	-
Private Universities	16	10
National Universities	4	11
Higher Institutes	-	-
National Public Universities	2	5
Technological Universities	3	-
International Universities	4	-

Alexandria Region

Educational Institutions	2023	2052
Public Universities	3	-
Private Universities	1	7
National Universities	2	2
Higher Institutes	-	-
National Public Universities	0	3
Technological Universities	1	-
International Universities	0	-

Delta Region

Educational Institutions	2023	2052
Public Universities	6	-
Private Universities	3	13
National Universities	3	8
Higher Institutes	-	-
National Public Universities	0	6
Technological Universities	2	-
International Universities	0	-

North Upper Region

Educational Institutions	2023	2052
Public Universities	2	-
Private Universities	2	5
National Universities	0	3
Higher Institutes	-	-
National Public Universities	2	3
Technological Universities	2	-
International Universities	0	-

Assiout Region

Educational Institutions	2023	2052
Public Universities	2	-
Private Universities	2	3
National Universities	0	2
Higher Institutes	-	-
National Public Universities	1	1
Technological Universities	2	-
International Universities	0	-

South Upper Region

Educational Institutions	2023	2052
Public Universities	4	-
Private Universities	1	6
National Universities	0	3
Higher Institutes	-	-
National Public Universities	1	4
Technological Universities	1	-
International Universities	0	-

Suez Canal Region

Educational Institutions	2023	2052
Public Universities	6	-
Private Universities	3	8
National Universities	2	2
Higher Institutes	-	-
National Public Universities	3	4
Technological Universities	1	-
International Universities	0	-

FIGURE (1 - 2) : EDUCATIONAL INSTITUTES IN EACH REGION

the unique potentials of each region aligns with the country's vision for inclusive growth and development. Also, by analyzing the anticipated population growth in each region, it becomes apparent that the number of educational institutions must be expanded to meet increasing demand. This proactive approach ensures that educational infrastructure keeps pace with the estimated rise in population and the concomitant enrollment rate and maintains a balanced student-to-institution ratio.

These are the statistics about the current educational institutions and the expected additional institutions by 2052 in each region. The educational institutions in 2022 and their projected requirements by 2052 are illustrated to accommodate the population growth in each region. The aim is to facilitate the increase in enrollment rates while also encouraging local students to complete their education and seek employment opportunities within their respective regions, reducing the need for migration.

This emphasizes the need for integration between educational institutions in each region to form consortiums that collaborate for the benefit of the educational process and the students. Integration can also help students benefit from the facilities of all universities in the consortium which is more sustainable as it helps bridge the gaps between different universities in terms of technological equipment and labs.

1.3 THE CONSORTIUM

1.3.1 Definition and Objectives

A consortium can be defined as the result of integrating the educational institutions and the economic activities within each region. The consortium is basically a collaboration between the different educational institutions in a region taking into consideration regional economic activities in order to sustain a self-sufficient region in terms of education and market needs.

The consortium emphasizes the importance of integration. It essentially gathers educational institutions under a bigger umbrella so that students can benefit from a comprehensive range of facilities and resources. This collaborative effort eliminates the need for students to relocate to different regions in search of specific facilities required for their chosen programs of study. Thus, it helps institutions introduce new programs to fill the gap between available programs and market needs.

The primary objective of the consortium is to bridge the gap between educational institutions and the market. It seeks to establish a connection and alignment between the skills and knowledge provided by educational institutions and the evolving demands and requirements of the market. Additionally, the consortium aims to introduce innovative educational strategies and facilities to enhance the overall learning experience.

By addressing the gaps that exist between academia and the market, the consortium endeavors to ensure that graduates are equipped with the relevant skills and competencies sought after by industry. The collaborative nature of the consortium fosters a dynamic environment where institutions can exchange ideas, share resources, and collaborate on initiatives that enhance the quality and relevance of education. This collaborative effort aims to foster a more seamless transition for students from the educational sphere to

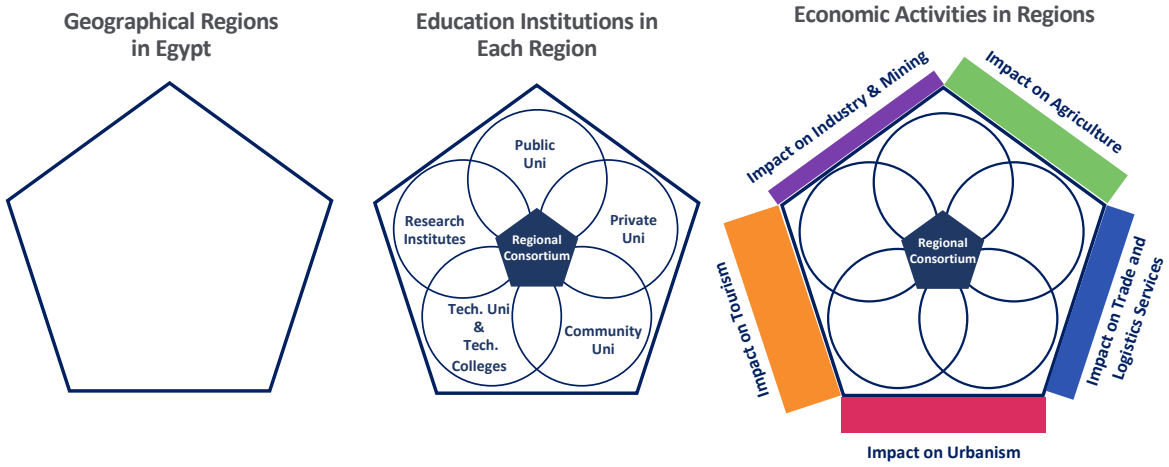


FIGURE (1 - 3) : CREATING AN EDUCATIONAL CONSORTIUM IN EACH REGION

the professional realm, while simultaneously addressing the ever-changing needs of the job market.

The consortium ensures that educational programs are comprehensive, relevant to market needs, supported by accessible institutions, and enriched by innovative strategies, and illustrates showcases the significance of national integration in education across different dimensions:

1.3.1.1 Bridging the Gap in Educational Programs

The consortium aims to address any disparities or gaps that may exist in educational programs. By identifying areas where programs may fall short, the consortium strives to enhance and refine the curriculum to ensure it meets the evolving needs of students and the market. Moreover, the consortium works to identify the needs of each region and to fill the gaps that exist between the educational programs and the real needs of each region to improve the system and add new educational programs to cover these needs.

1.3.1.2 Meeting Market Demands

Recognizing the importance of aligning education with market requirements, the consortium endeavors to fulfill the needs and expectations of the market. By understanding the skill sets and competencies sought by the job market, the consortium can adapt educational programs to equip students with the relevant knowledge and abilities.

The consortium makes a strong connection between the market and educational institutions, encouraging and supporting graduates to seek employment opportunities within their own regions. This integration enables graduates to contribute to the improvement

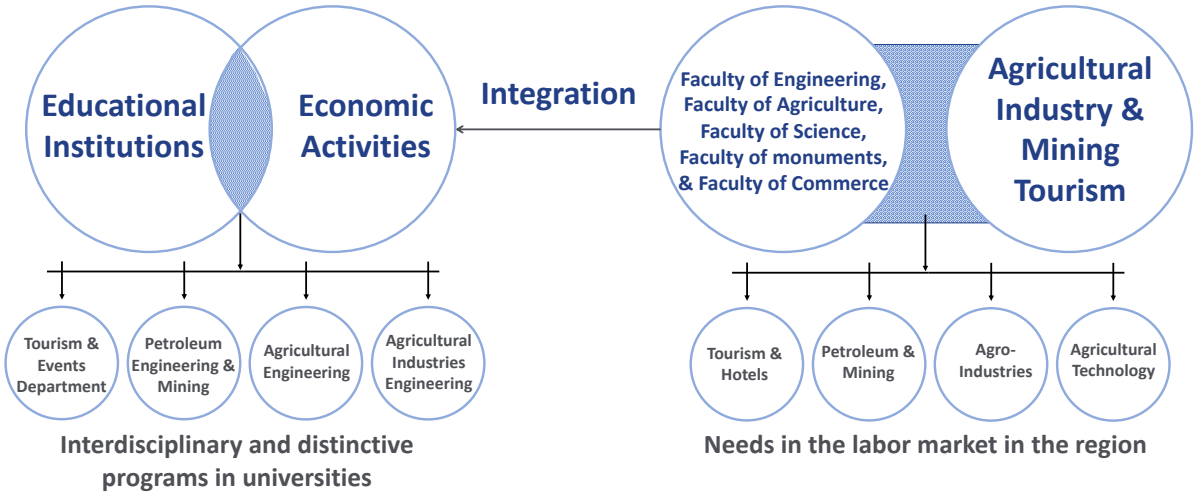


FIGURE (1 - 4) : CREATING AN EDUCATIONAL CONSORTIUM IN EACH REGION

and development of their local communities while boosting their skills and knowledge to maximize the potential of the region's economic activities.

This helps the region to participate productively in the economic development of the country and decreases the pressure on certain regions that have traditionally been attractive for graduates seeking jobs related to their studies.

To encourage integration between the education sector and other economic sectors, the government has granted investors in the education sector certain investment incentives and advantages detailed in the new investment law to encourage investment in the sector. It has also mentioned some other incentives associated with certain geographical regions designated "regions most in need of development."

The geographical segmentation of the country plays a significant role in achieving integration where the territorial differentiation of production happens in correlation with integration tendencies in the economy. Accordingly, regional boundaries must be considered in the distribution of educational institutions and areas of specialization. This is known as "regional education". Each territorial complex must, in every possible way, develop its own economy with the attendant necessary infrastructure. Thus, the collaboration between educational institutions

within regions and their alignment with the economic activities available helps equip graduate students to add to the market in the region.

The regional educational systems require the flexibility to respond to the requirements of the population and the economy as well as close connections to global interests and development trends to ensure the preservation of the integrity, stability and continuity of the education system and provide the prerequisites to its inclusion in the world educational system.

1.3.1.3 Introducing New Educational Institutions

The integration between educational institutions in a certain region may also help identify possible integration opportunities with educational institutions from other regions or other consortiums in order to share facilities or highlight the need to add new educational institutions to the region such as:

- Public universities teaching disciplinary programs
- Private universities teaching multidisciplinary programs
- International universities teaching international programs
- Technological universities teaching technological programs
- Innovation centers
- Career centers
- Research centers

1.3.1.4 Introducing New Strategies

The integration between educational institutions in a certain region helps introduce new work strategies as well as new educational strategies. These include the following examples:

- Smart governorates with smart integrated systems between institutions: Educational institutions collaborate closely with each other and implement advanced technologies and systems to enhance the efficiency and effectiveness of educational processes.
- Teamwork strategies: Collaboration and teamwork among students and faculty members are encouraged where educational institutions promote the exchange of ideas, perspectives, and expertise, leading to enhanced problem-solving and critical thinking skills.
- Group research: Integration supports the development of group research initiatives where students and researchers from various disciplines collaborate to address complex problems and contribute to interdisciplinary knowledge creation.
- Interdisciplinary research: This encourages the integration of knowledge and methodologies from different fields. By bringing together diverse perspectives, interdisciplinary research generates comprehensive insights and supports innovative solutions.
- Data exchange between institutions and individuals: This facilitates the sharing of information, research findings, and resources, promoting collaboration and fostering a culture of continuous learning and improvement.
- Smooth mobility for students and professors: Integration ensures smooth mobility for students and professors between different educational institutions within the region. This mobility allows for diverse learning experiences, exposure to different teaching methodologies, and access to specialized resources and expertise.
- Interactive strategies to absorb population and enrolment rates growth: These strategies include the expansion of educational facilities, the development of new programs, and the implementation of innovative teaching methods to meet the evolving needs and demands of the student population.

By embracing these strategies, educational institutions within a region promote collaboration, innovation, and adaptability. This integration enhances the overall educational experience, fosters interdisciplinary approaches, and prepares students for the challenges of a rapidly evolving world.

1.3.2 Consortium Executive Committee

The consortium should have an executive committee which provides leadership, guidance, and oversight to ensure successful functioning and achievement of objectives. It plays a crucial role in coordinating and managing the activities of the consortium, fostering collaboration among member institutions, and driving strategic decision-making processes.

The responsibilities of the committee include:

- Strategic planning: The committee is responsible for developing and implementing the strategic direction of the consortium. This involves setting goals for educational institutes in relation to market needs and establishing a roadmap for achieving the consortium's objectives.
- Governance and decision-making: The committee ensures effective governance structures and processes of collaboration are in place within the consortium. This includes establishing policies, procedures, and guidelines for decision-making,

as well as ensuring compliance with any legal and regulatory requirements.

- Financial management: It oversees the financial aspects of the consortium, including available budgeting, resource allocation for institutes in the region, and financial reporting. It ensures that financial resources are appropriately managed and utilized to support consortium activities.
- Engagement and collaboration: It facilitates collaboration and engagement among consortium educational institutes and fosters a spirit of cooperation, promotes effective participation, and provides communication channels.
- Stakeholder relations: it serves as a link between the consortium and external stakeholders, such as government bodies, funding agencies, industry partners, and NGOs to provide feedback in the educational and learning process. It represents the consortium's interests, builds relationships, and seeks opportunities for collaboration and support.
- Monitoring and evaluation: The committee monitors the progress of the consortium's initiatives and projects. It assesses the effectiveness of the strategies and identifies areas for improvement.
- Resource utilization: The consortium's initiatives involve seeking funding opportunities, engaging with potential sponsors or donors, and developing partnerships with industrial entities to support consortium goals.

Overall, the consortium executive committee plays a pivotal role in sustaining consortium goals for better education and learning experience. It provides coordination and strategic guidance to ensure the success and effectiveness of the consortium. To ensure comprehensive decision-making and well-formed perspectives, the committee's board should consist of diverse members from industry, government, and academia. This diversity enables the committee to benefit from a wide range of perspectives, expertise, and opportunities, contributing to the overall strength and innovation of the consortium's initiatives.

1.4 INTERNATIONAL INTEGRATION LEVEL

Alongside the significance of integration at the national level, international integration is a crucial aspect to consider. International integration involves establishing connections and collaborations between national educational institutions and their international counterparts, taking inspiration from nations that have undergone similar phases of educational development. This process of internationalization has a profound impact on the educational system and, consequently, the global market.

Through international integration, educational institutions can gain best practices from their counterparts. This exchange of knowledge and experiences allows for the adoption of innovative teaching methodologies, curriculum enhancements, and advancements in educational technologies. Through international collaboration, the quality of education can be enhanced, and students are better prepared for global opportunities. This also provides students with intercultural experience that enhances their ability to thrive in a multicultural world and effectively contribute to the global market.

A key role of higher education is strengthening economic competitiveness in the global market. It is more likely that the adoption of internationalization by universities is one way to fulfil this role. Internationalization of higher education can even help in solving the economic problems of Higher Educational Institutions (HEIs).

The main directions of focus for the internationalization of higher education include:

- Integrating international dimensions and fostering intercultural skills in teaching, research, and services, linking pedagogical efforts and resources.
- Offering new interdisciplinary programs while integrating international perspectives, cross-cultural understanding, and global issues into the curriculum
- Encouraging research collaboration between institutions across borders. This can involve joint research projects, co-publications, and sharing of resources and facilities to foster knowledge exchange and innovation.
- Forming strategic partnerships between HEIs across countries. These partnerships can involve joint degree programs, dual-degree agreements, and collaborative research initiatives, enhancing institutional cooperation and academic quality.
- Introducing new educational institutions such as international universities, research centers, innovation centers, and career centers.
- Imparting international experience, skills, and knowledge for education improvement and providing the knowledge and qualities necessary for graduates to function outside their own country and compete in the international labor market.

- Encouraging the mobility of students and teachers through exchange agreements and international internships.
- Encouraging the enrollment of international students and scholars to promote diversity and intercultural exchange.
- Providing language and cultural support services to international students, ensuring their smooth integration into the local academic environment.
- Adapting to market-based rationales through educational initiatives, policies, training programs, and diplomas.
- Embracing virtual collaboration tools and platforms to facilitate international collaboration and learning. This includes online courses, virtual exchange programs, and remote research collaborations, allowing for increased accessibility and flexibility in global engagement.
- Aligning internationalization efforts with quality assurance and accreditation frameworks to ensure that international collaborations meet high academic standards and contribute to institutional excellence.

These directions of internationalization in higher education collectively aim to prepare students, faculty, and institutions to thrive in a globalized world, foster cultural understanding, and contribute to the advancement of knowledge on a global scale.

The MOHESR is aware that an increase of internationalization in the higher education sector is a major contributor to the growth of the global higher education market as it integrates intercultural and international dimensions of teaching and research. A key part of this process is increasing the attractiveness of Egypt's HEIs to incoming international students. Not only does the ministry work on increasing the cohort of freshly admitted students each year, but it also integrates students transferring from abroad, provided that these students submit a certificate of enrolment and scientific content for the subjects that have been studied in order to determine course equivalence in the corresponding Egyptian universities and colleges.

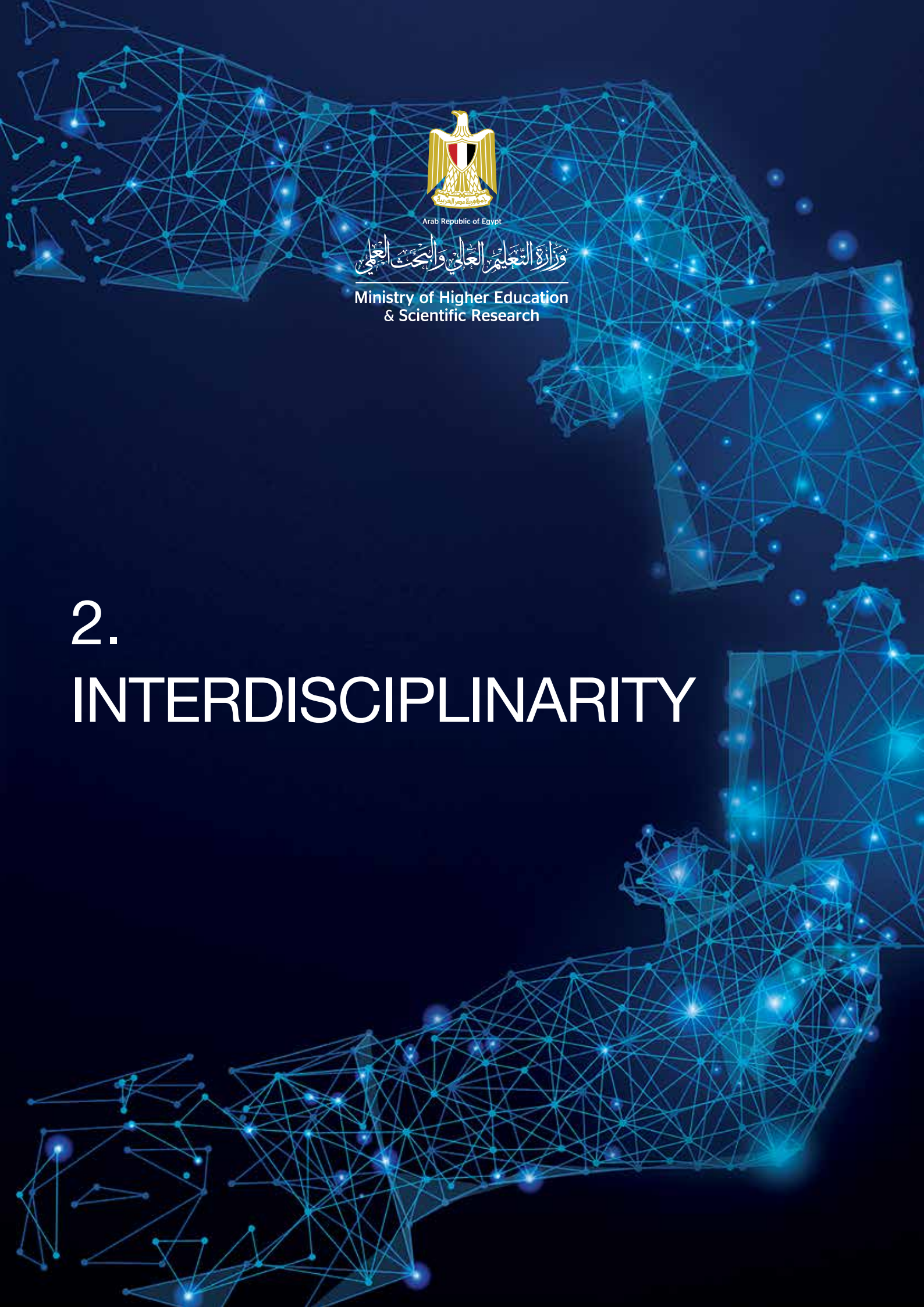
In addition to Egypt's centralized location, the availability of diverse student activities and experiences makes Egyptian HEIs more attractive to international students than their regional peers. Egypt offers a multitude of cultural experiences for expatriate students both in major cities such as Cairo and Alexandria and in universities in more remote locations that provide a deep connection the natural world and access to exceptional adventures. The ministry strives to create connections between international students and Egyptian culture, but also encourages them to celebrate their roots through active participation in the student experience through activities such as participating in electing community representatives to the student union elections or celebrating national days.

1.5 WHAT'S NEXT?

Overall, integration on both national and international levels requires collaborative and coordinated efforts among educational institutions, government, and industry. It involves the harmonization and alignment of policies, practices, and initiatives to achieve common goals and address shared challenges in the field of education. By promoting integration on both national and international levels, educational systems can benefit from shared knowledge, resources, and expertise. It is a process that enables the exchange of ideas, best practices, and innovative approaches, ultimately enhancing the quality of education and fostering global collaboration in addressing common educational challenges. Four main steps are necessary to realize these goals:

- Integration between educational institutions through regional alliances and the formation of consortiums and the attendant executive committees.
- Integration within the regions to meet current and future needs in terms of distribution of institutions according to projected growth and enrollment rates.
- Integration with the labor market, economic activities, and local and international institutes through the establishment of a system that supports interdisciplinary programs.
- Integration with state governmental institutions that are partners in the national strategy.

This analysis highlights how the principle of integration is critical in building capacities that can drive the higher education system towards 4th-generation universities. It also leads to the realization that it is vital to integrate interdisciplinary programs in order to keep pace with current and future challenges and compete in the international market. Interdisciplinary programs in universities in this case become tools of integration that fill knowledge gaps, promote critical thinking, enhance collaboration, and align education with the needs of the changing world. They provide a comprehensive education system that prepares students to tackle real-world problems and contribute to a more interconnected and dynamic society.



2.
INTERDISCIPLINARITY

2.1 INTRODUCTION

Real-life problems are often complex in nature and require the collaboration of experts from diverse backgrounds to first understand the nature of the issue and then to develop solutions that capitalize on the synergy of this multidisciplinary approach. The integrated effort of experts with different perspectives improves research, prompts innovation, and leads to cohesive solutions. This chapter examines the concept of **"interdisciplinarity"** and highlights its implications for market demands.

In general, the different faculties in the Egyptian higher education system are divided into sectors, such as science and engineering, arts and humanities, and life and health sciences. Interdisciplinarity aims to create interdependence between the various scientific and literary sectors through interdisciplinary specializations that can address local problems and challenges and fulfill the needs of the rapidly changing local and international labor markets. Interdisciplinary programs that evolve from the integration of different disciplines, programs, or even institutions can provide a better quality of education and fulfill market needs by linking the various sectors directly to the Egypt 2030 development vision in fields such as urbanization, industry, mining, tourism, and agriculture.

2.2 DISCIPLINARITY VERSUS INTERDISCIPLINARITY

2.2.1 The Difference

Traditionally, universities are organized into departments based on the disciplines they offer their students. A discipline is a field of study, or a branch of knowledge studied in higher education institutions (HEIs) wherein experts can critique the work of their peers and add to the body of knowledge. Disciplinary experts are necessary for understanding problems within their fields of study, however, their perspective is often limited when tackling more complex issues. Interdisciplinary approaches adopt a broader view by surveying the problem, then assembling various experts according to the needs and contexts. Even so, strong disciplines are the basis for the establishment of interdisciplinarity in higher education.

The interdisciplinary approach involves pruning the borders between branches of knowledge to tackle ill-defined problems that cannot be represented through one specific knowledge area. Problems and complex situations outside the normal borders of disciplines can then be redefined to develop better solutions. Interdisciplinary approaches come to the forefront when traditional disciplines cannot address important complex problems and the need to combine two or more fields of expertise becomes evident.

Addressing problems within the narrow artificial boundaries of disciplines sometimes causes effective solutions to be missed as the links between different disciplines or phenomena are overlooked. The nature of real-world problems is complex and interconnected, making it necessary to tackle them with the help of experts from different fields in a cooperative manner. Consequently, the importance of interdisciplinarity in higher education has become self-evident across all disciplines.

Disciplinarity is an inherent learning and teaching approach; however, markets function more in an interdisciplinary way. Dominant narrow and deep specialization in most disciplines is making research less applicable in practice and less relevant to fast-changing societal needs. This tendency in disciplines may raise bias and cause stagnation thus impeding exchange of knowledge and ideas across disciplines. The gap between the market and HEIs can be bridged through interdisciplinary degrees, research, and pedagogy.

While interdisciplinarity fosters collaboration and integration within disciplinary boundaries, the transdisciplinary approach aims to transcend disciplinary boundaries and engage with diverse stakeholders to address complex, real-world problems. This approach harmoniously integrates different disciplines to construct new knowledge and uplifts the learner to higher domains of cognitive ability and sustained expertise and skills. The transdisciplinary approach moves beyond university borders to integrate academic knowledge and skills into more developed and associated practices. The transdisciplinary concept is to merge academia with professional practice to tackle complex real-life problems and academic subjects that can be better handled by other types of disciplines in academia. It entails the integration of two or more academic fields into a single action to create something

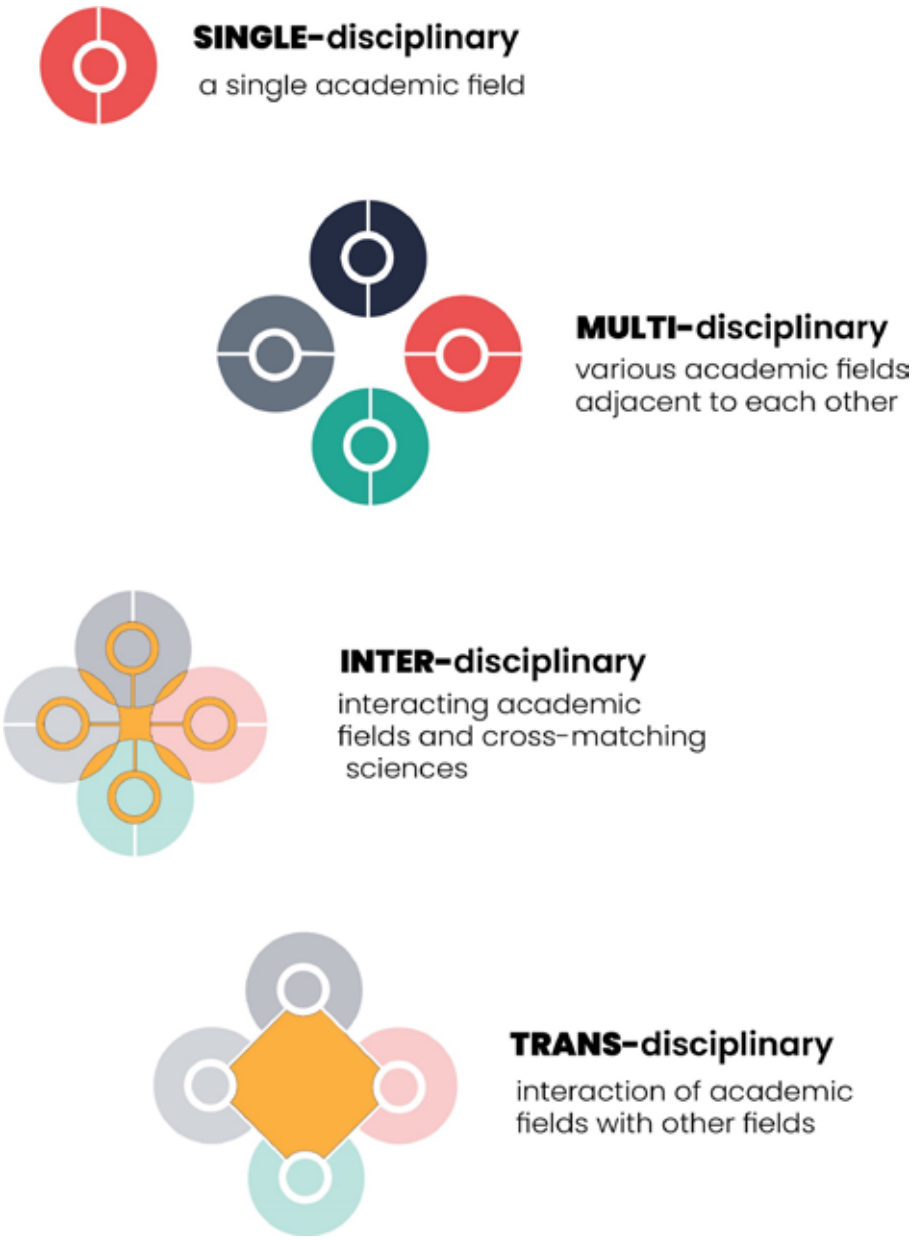


FIGURE (2 - 1) : THE DIFFERENCE BETWEEN THE DISCIPLINES

new by crossing boundaries and thinking outside the box. The figure below shows the differences between these terms.

2.2.2 Interdisciplinarity for Labor Market Needs

In a world that is becoming more complex, the urge to create new prospects for state-of-the-art careers is continually rising. Traditional jobs are diminishing whereas opportunities for new careers are expanding, especially in the entrepreneurial realm. This necessitates the adoption of interdisciplinarity to fulfill market demands, face global competition, and address the needs of development, technological advancement, and employability.

There is a drastic change in employment today. Employers now understand the need to hire graduates who are equipped with a certain level of skill and competency and capable of working in an interdisciplinary team smoothly and effectively while adapting to the diverse settings of a productive work environment. This requires developing interdisciplinary programs and degrees, which follow local market needs and global challenges, originated from the intersection between disciplines such as agricultural engineering, robotics, artificial intelligence, big data, bioinformatics, finance and technologies, and data sciences. Curriculum development should not only address personal growth but also increase employment chances as well.

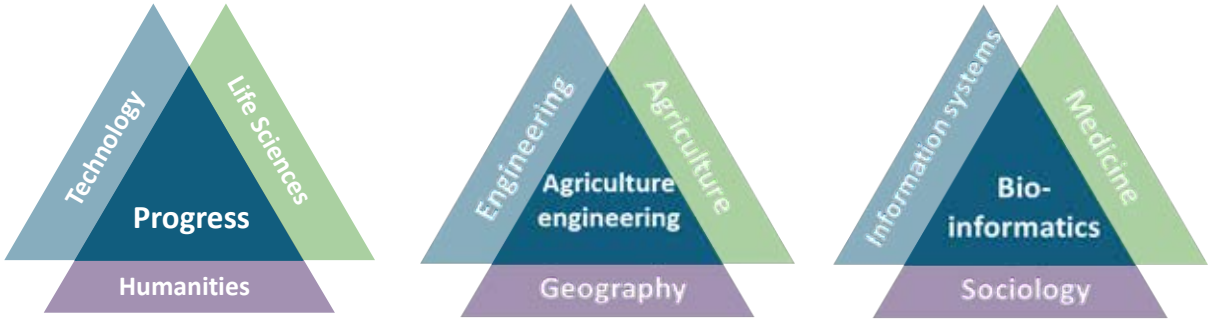


FIGURE (2 - 2) : EXAMPLES FOR PROGRAMS STRUCTURED BASED ON INTERDISCIPLINARITY

It is necessary to build an interdisciplinary approach by qualified experts who can pinpoint evolving market needs and challenges and bridge disciplines to align with cross-cutting issues in order to realize economic development and social welfare. The collaboration between experts from different scientific backgrounds addresses the level of complexity found in real life problems and supports their practical and creative resolution. Interdisciplinary programs allow students to widen the horizon of their thinking and perception, acquire competencies and creative skills, work in teams and individually, and find practical solutions for multi-faceted problems. As such, graduates acquire versatility and become capable of working in diverse, changing environments.

The importance of interdisciplinarity lies in fulfilling market needs. Accordingly, some changes are necessary in the higher education vision. First, the availability of more than one technical perspective to deal with the problem is required. This perspective of interdisciplinary programs in private universities and universities of technology supports the concept of integration that was addressed earlier, where public universities, national universities, and technological universities will become the incubator for the parent colleges that support interdisciplinary programs. This can help fulfill the goal of producing a generation of graduates that can fulfill the needs within their regions and compete in the international market.

Second, it also requires proposing interdisciplinary specializations in several future jobs such as robotics, artificial intelligence, digital economy, space science, nuclear energy, virtual reality, IoT solutions, information security, cyber security, nanotechnology, cloud computing, machine learning, biomedical engineering, aerospace and communications engineering, data analysis, big data, data science, block chain development, geographic information systems (GIS), remote sensing, digital currency, and product management.

These programs should be developed through a lens that takes national and international market needs into account, not just currently but also in the future, thus keeping Egyptian graduates competitive on both international and national levels.

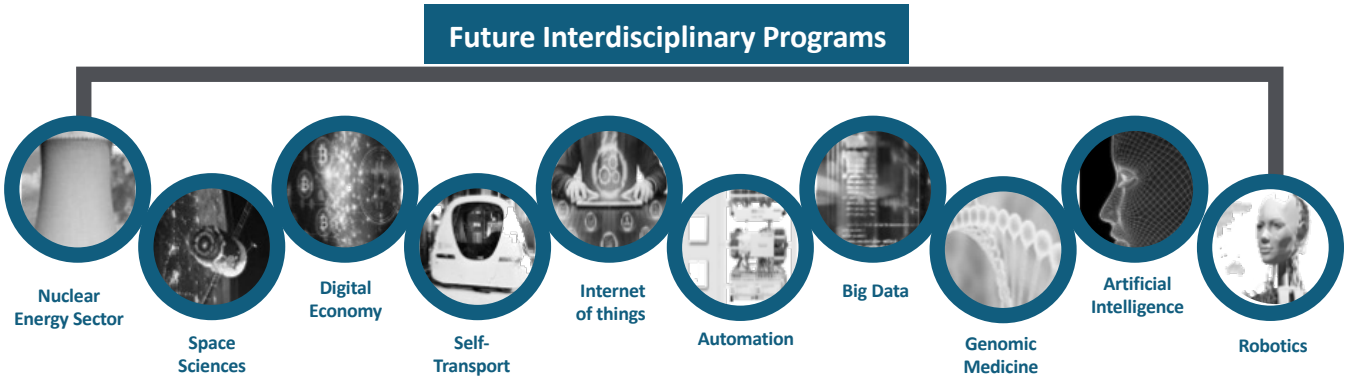


FIGURE (2 - 3) : EXAMPLES OF FUTURE INTERDISCIPLINARY PROGRAMS

One of the key responsibilities of higher education is to develop modern curricula that align with the concept of the fourth generation of universities. To achieve this, curricula development can be categorized based on three program types:

- Community service: These are programs of a service nature that are not directly related to resource availability or spatial challenges. The focus is on serving individuals, addressing societal needs, and making a positive impact.
- Global excellence: These programs specialize in emerging areas of study and are recognized for their excellence on a global scale. Such programs are not constrained by resource availability and spatial challenges. They target raising competitiveness on an international level and contributing to innovation and creation of cutting-edge knowledge.
- Regional resource development (human/natural): These are designed to address the development needs of the resources available in the region, whether human or natural. The curriculum is tailored to match the unique characteristics and requirements of the region with specializations related to local market demands.

It is anticipated that university graduates will be equipped with the competencies and skills that will qualify them in terms of mental fitness and the rapid development of technology, thus allowing them to keep pace with the rapid changes in global requirements.

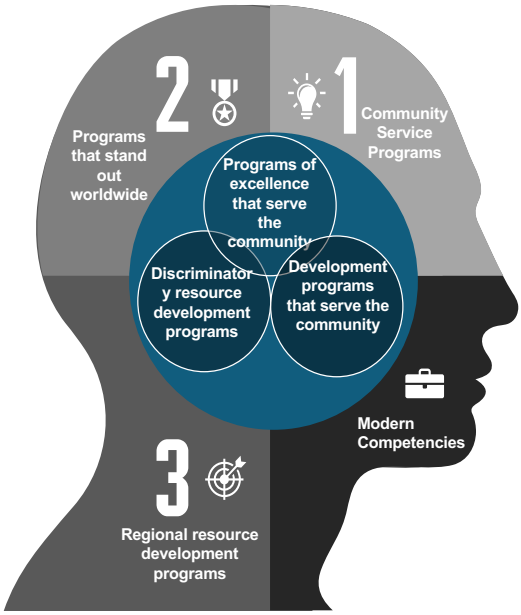


FIGURE (2 - 4) : DIFFERENT PROGRAM TYPES

2.3 THE ROLE OF HIGHER EDUCATION IN INTERDISCIPLINARITY

Interdisciplinarity in higher education involves the integration of at least two academic disciplines for research, teaching, and program and degree certification. HEIs should support interdisciplinary teaching to provide the skills and knowledge required in the labor market. Artificial borders of disciplines should be redrawn to transcend disciplinary thinking and adapt to current and emerging challenges to development. The role of HEIs can be summarized as follows:

- Preparing a cadre of leaders and skilled personnel to help address the issues facing governments, societies, and companies.
- Applying interdisciplinary approaches in teaching, research, and training to best meet future employment requirements and leadership positions.

The paradigm of education and research has changed; today there is a major role for universities in economic and social development. To prevent management bureaucracies that hinder the success of interdisciplinary environments, the vision of the Ministry of Higher Education and Scientific Research (MHESR) depicts the integration of problem-based learning and interdisciplinarity in HEIs in Egypt. It

focuses on sustaining an interdisciplinary environment for research, teaching, and degree offering.

The role of the university is no longer confined to education, research, and knowledge production, rather, it has a proactive role in economic development. Accredited universities act as the steering wheel for local economies as they fulfill the needs of society. To evolve, a synergy between university, industry and government should exist, which can be described using the triple helix model in Figure 2.5. In this model, the role of the university lies in collaborating with firms, forming industrial partnerships and making use of the support of NGOs and trade organizations. The industry's role is to ensure knowledge transfer to practice by supporting the use of scientific knowledge and investing in research and development (R&D). On the other hand, the governments' role is to support this partnership and provide incentives for the contribution of relevant stakeholders. Innovative and holistic solutions can be created from the three perspectives to solve real-life problems that face society, industry, and the Egyptian economy.

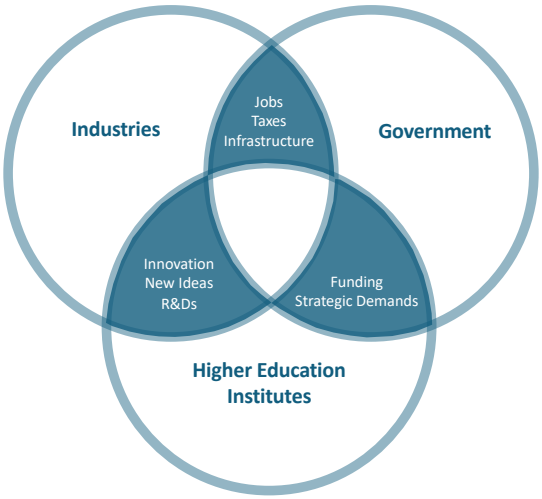
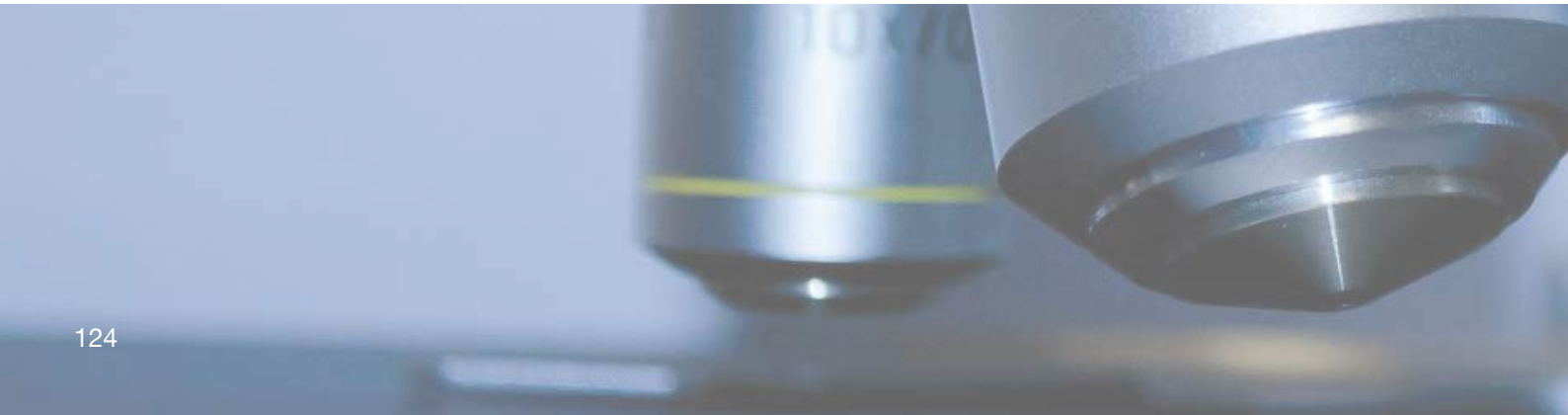


FIGURE (2 - 5) : SYNERGY BETWEEN HEIS, INDUSTRY & GOVERNMENT

Interdisciplinarity is aligned with Egypt's plan to move to the fourth generation of universities, necessitating a significant transformation in the HEI system. Educational reform and technological advancement are required in tandem with the necessary legislation that ensures its sustainability as planned and illustrated in Figure 2.6. It presents three main sectors: engineering sciences and technology, life sciences and medicine, and human sciences, all under the same administrative control.

The administrative structure of the university should accordingly respond to these reforms to facilitate the acquisition of knowledge coherently.

Administrative changes and policies should ensure that Egypt produces graduates capable of solving multi-faceted problems. Restructuring the administrative skeleton, which consists of student and education affairs, community service and environment development affairs, and postgraduate affairs, can be undertaken to make them responsible for all three sectors under the auspices of the vice president for entrepreneurship and innovation as well as the vice president for international collaboration.



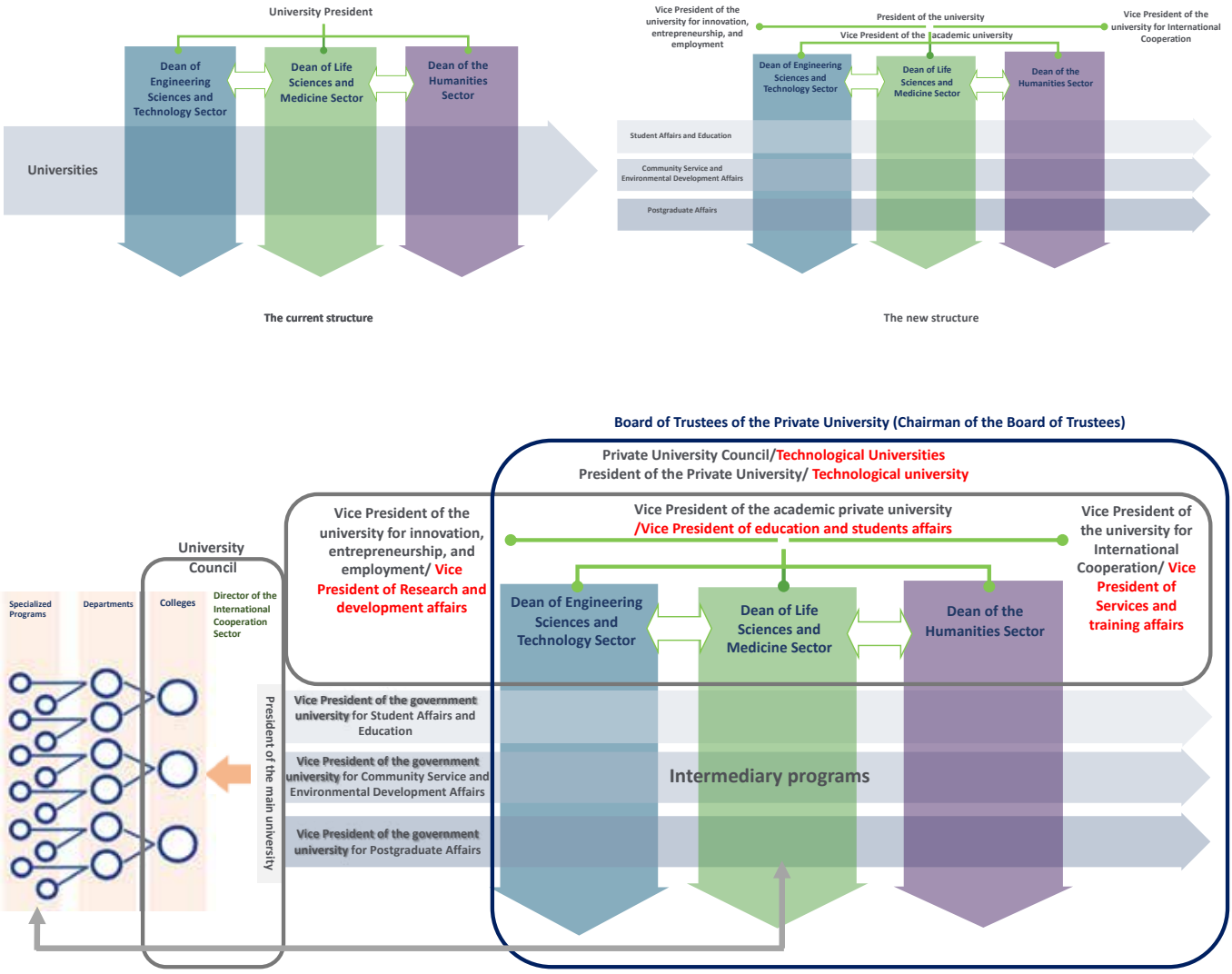


FIGURE (2 - 6) : NEW UNIVERSITIES ADMINISTRATIVE STRUCTURE

Our aim in MOHSR is also to restructure the supreme councils of universities and unify the university regulation act under a comprehensive vision that serves the concepts of interdisciplinary programs. The purpose comprises three main sectors: executive board members, civil society, and industry, again all falling under common administrative control. The sector committees will also be restructured, pivoting from the specialized concept to the interdisciplinary concept with relevant legislative amendments to serve the new structure, providing a coherent strategy to ensure that the administrative units are in synergy with the interdisciplinary education environment.

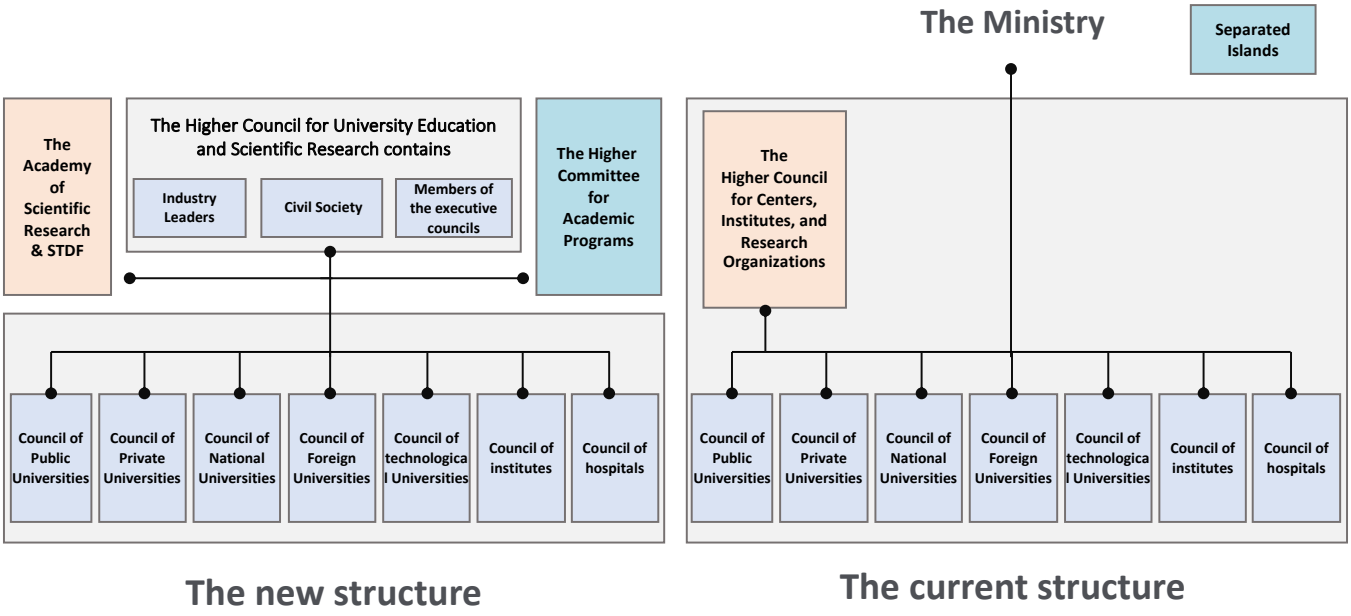


FIGURE (2 - 7) : THE NEW VS CURRENT STRUCTURE OF THE SUPREME COUNCILS OF UNIVERSITIES

Administrative support for interdisciplinary programs is essential to sustain the collaboration and success of interdisciplinary research, programs, and degrees. In this regard, incentives are provided for the promotion of staff as well as the progress of students. Similarly, advancement in technology improves educational outreach. In addition, it facilitates the transformation towards interdisciplinary programs and degrees. Broader participation and collaboration between different HEIs nationally and internationally also become easier. Technological developments also allow them to bring in expertise from around the world for research collaborations, as well as facilitating inter-campus collaboration. Introducing massive open online courses (MOOCs) can also enable people with different backgrounds to work together in teams. The Egyptian higher education policies should be instituted to facilitate integrating interdisciplinarity, and initiatives for capacity building and human resources training must also be developed.

2.4 CAPACITY BUILDING FOR INTERDISCIPLINARITY

2.4.1 Preparing Faculty

Capacity building for interdisciplinarity refers to the process of developing the knowledge and skills necessary for individuals and institutions to engage effectively in interdisciplinary work. It is required to prepare faculty cadres capable of achieving the necessary efficiency and fulfilling the vision through the new inter-link with the labor market. Raising the proficiency of faculty members to work within interdisciplinary programs that serve local and global problems is critical to face societal problems that require teamwork with experts from intersectional and interdisciplinary specializations, industry, and society.

The institutions have a role in promoting collaboration and networking among faculty members, researchers, and professionals from different disciplines. Rules and incentives are focused on encouraging interdisciplinary research projects, joint publications, and interdisciplinary conferences that foster knowledge sharing and collaboration. The funding and resource allocation is another aspect to consider for interdisciplinary research and initiatives. Research grants, research centers or institutes can provide financial and administrative support for interdisciplinarity. As a result, a supportive institutional environment that fosters and facilitates interdisciplinary work is an important aspect of capacity development.

Preparing faculty requires organizing training programs and workshops that focus on interdisciplinary approaches, methods, and collaboration. These initiatives can provide faculty and researchers with the necessary tools and

FIGURE (2 - 8) : PREPARING FACULTY FOR INTERDISCIPLINARITY

strategies to engage in interdisciplinary work. This includes developing pedagogical strategies, integrating multiple perspectives, and promoting active learning in interdisciplinary settings.

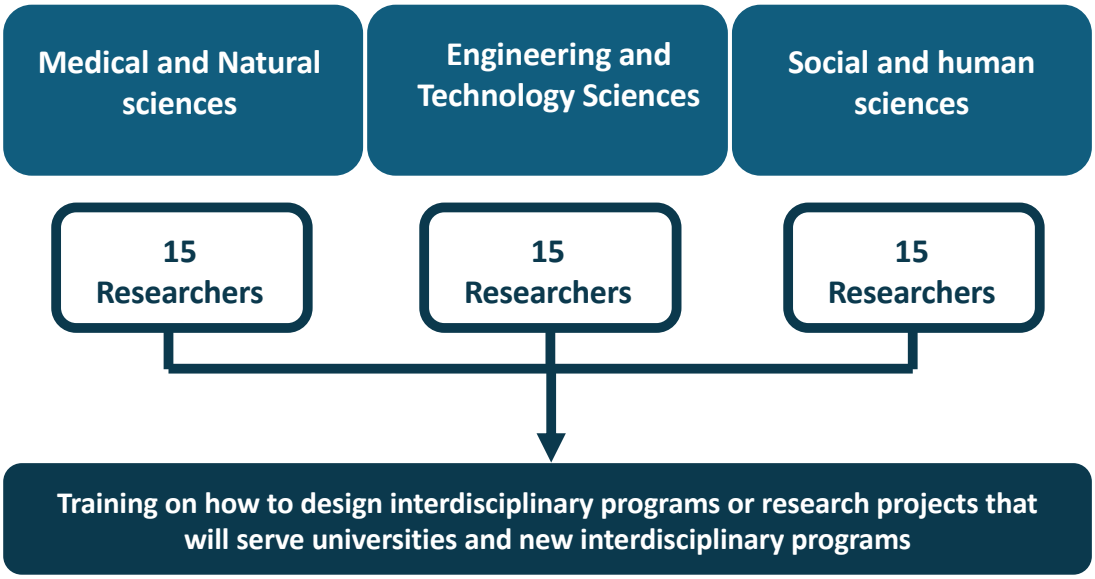


FIGURE (2 - 9) : TRAINING RESEARCHERS TO SERVE THE FUTURE VISION OF INTERDISCIPLINARITY

The training includes how to design and offer interdisciplinary courses that encourage students and faculty to work across disciplinary boundaries. The development of these courses can facilitate interdisciplinary thinking, teamwork, problem-solving skills, and a good understanding of various disciplinary perspectives. These training courses are to be offered for teaching staff and researchers from various fields and disciplines from medicine, engineering, and human sciences.

Fostering interdisciplinary thinking started with a presidential initiative launched in 2016, the Egyptian Knowledge Bank (EKB) which promotes a holistic approach to knowledge acquisition and problem-solving. It serves as a platform for various national projects focused on educational development. The EKB aims to provide unrestricted access to an extensive collection of knowledge, cultural resources, and scientific content. It offers resources that bridge various areas of knowledge, encouraging learners to develop a holistic understanding of complex topics and recognize the interdependencies between disciplines. Moreover, it supports the development of interdisciplinary courses and programs by providing access to relevant resources, enabling educators to design curriculums that integrate multiple disciplines.

2.4.2 Building a Program Portfolio for Students

Another aspect for capacity building is enhancing student support services which include counseling, career guidance, academic advising, and student development programs. This can contribute to student success, retention, and overall satisfaction. Thus, the integration of career centers and innovation centers with training centers and faculties is essential in the formation of student program portfolios. This portfolio aims to help students develop a comprehensive and organized collection of experiences, achievements, and credentials related to their career and academic goals. It showcases their relevant academic projects, research work, internships, extracurricular activities, and certifications, thus highlighting accomplishments that demonstrate their qualifications, skills, and potential to employers or institutions.

There are several dynamic forces as shown in Figure 2.10 that are considered the building units of a program portfolio. These forces are the faculties that provide the academic factor, the training centers that provide the intersection between the academic profile and the career profile of the student, as well as the innovation centers and career centers that work on providing the students with the needed skills to manage their careers after graduation and fulfill market needs.

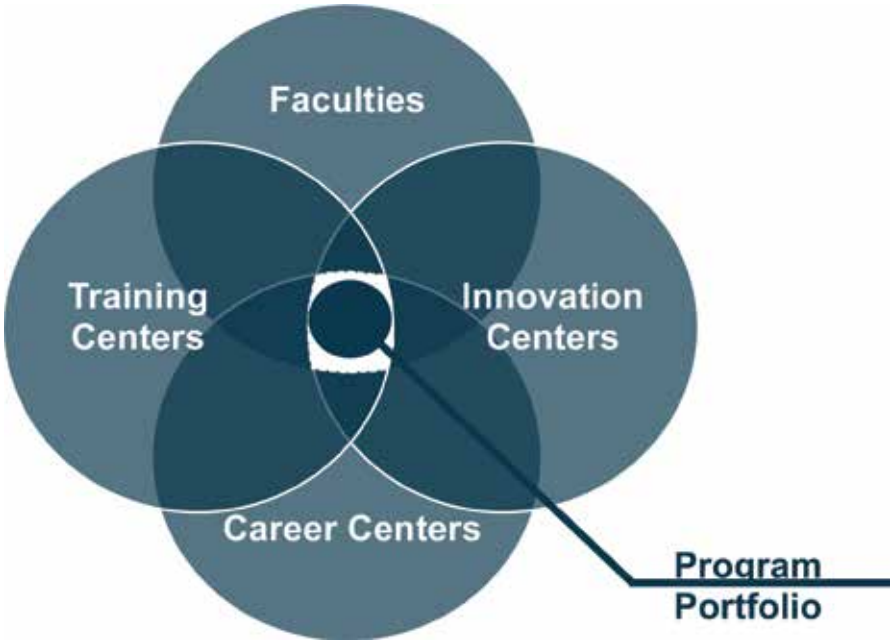


FIGURE (2 - 10) : BUILDING BLOCKS OF THE PROGRAM PORTFOLIO

There are two main components necessary to build a student's program portfolio: the academic profile and the career profile. The academic profile is all about the education provided to the student through the academic courses and programs with the help of the academic advisor. These academic courses consist of sets and modules related to the program the student is interested in. The output of this sector is a well-educated and knowledgeable student with an academic transcript that gives him his first steps towards his dream career.

The career profile, on the other hand, is all about the skills the student gains through what is called career education and experiential learning. This is done through the career and innovation centers of each educational institution. The output here is a student with a career profile that showcases diverse experiences and attendant skills.

With both these components, the program portfolio is now nearly complete for the student; the final missing factor is the role of training centers in this process. This is considered the pivot that connects the career education and the academic education for the student and helps build a perfect program portfolio.

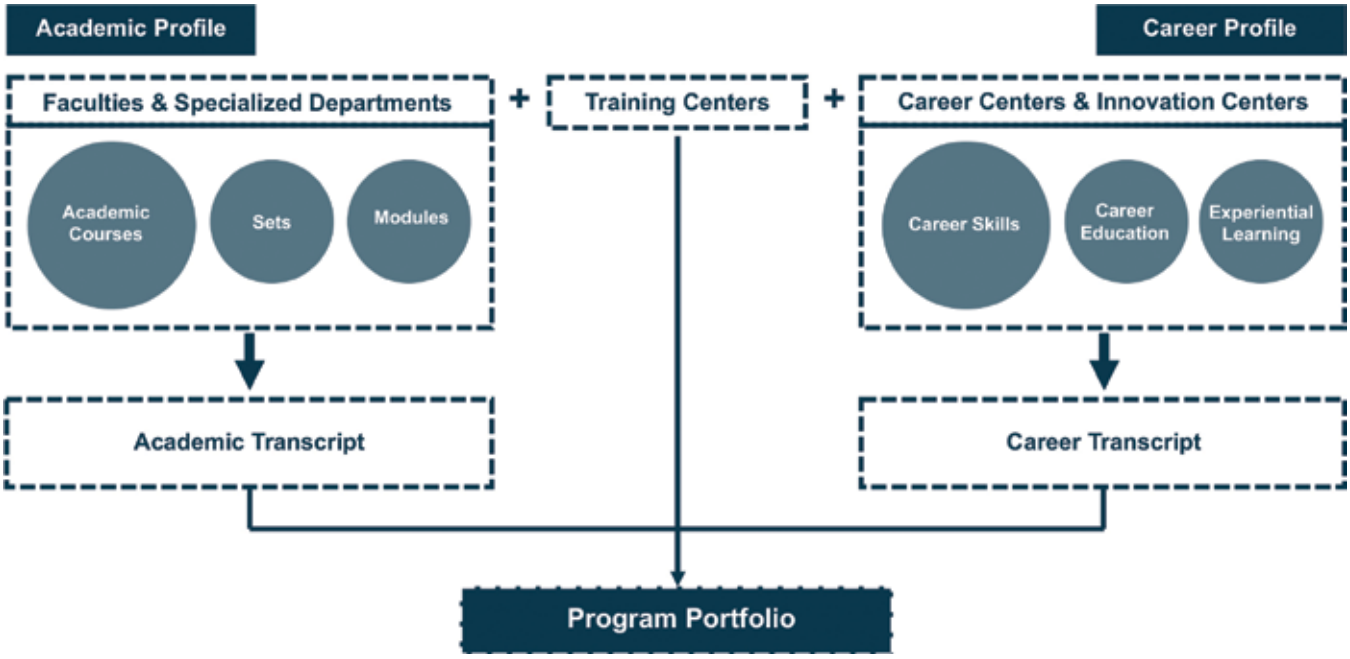


FIGURE (2 - 11) : COMPONENTS OF THE PROGRAM PORTFOLIO

2.4.3 Capacity Building Initiatives

Other initiatives are also suggested to empower the Egyptian higher education institutions to adapt to addressing emerging challenges and improve the quality of education. These contribute to the socio-economic development of their communities and include the following:

1. Establishing dedicated platforms or centers within the institution that serve as hubs for interdisciplinary collaboration. These platforms can bring together researchers, students, and practitioners from different disciplines to facilitate knowledge exchange, networking, and collaborative projects.
2. Encouraging collaboration between HEIs and external partners such as industry, government agencies, and NGOs. These partnerships can provide interdisciplinary research opportunities, access to real-world problems, and additional resources for interdisciplinary work.
3. Offering professional development opportunities for faculty members and researchers to enhance their interdisciplinary skills and knowledge. This can include workshops, seminars, and training programs focused on interdisciplinary research methods, collaboration techniques, and grant writing.
4. Reconsidering the equivalence of master's and doctoral degrees for returning colleagues and those on scholarship from abroad in interdisciplinary disciplines to facilitate appointment in the new and intermediate, specialized departments.
5. Introducing new interdisciplinary programs (undergraduate and postgraduate) to inter¬committees that were previously formed. The Supreme Council of Universities is composed of the members of the sector committees that already exist to study and provide guidance. This can speed up and facilitate the necessary approvals and procedures and to ensure the adoption of regulations in universities after new programs are introduced.
6. Encouraging advancement and promotions for scientific excellence in intermediate sciences and advanced new sciences.
7. Encouraging and approving several state awards in advanced intermediate sciences for young researchers.
8. Addressing the trade unions by opening new divisions that are consistent with the vision of the Supreme Council of Universities in granting interdisciplinary degrees such as nanotechnology, biotechnology, energy science, and so on.

2.5 THE PROCEDURE OF REALIZING INTERDISCIPLINARITY

2.5.1 Structuring of Programs

The vision of interdisciplinary studies programs in Egypt is to design new interdisciplinary academic programs to engage students actively and constructively in rigorous, hands-on experiences so that they master different methodologies in an integrated way.

For example, one of the planned interdisciplinary programs is in biotechnology, which prepares students for the highest levels of careers in research and practical applications of biotechnology tools (biomolecular, biochemical, biomedical, and bioengineering approaches). The departments which can participate in this program are Biology, Chemistry, Psychology, Computer Science, Mathematics, Earth and Environmental Science, Engineering Management, and Chemical, Mechanical, Materials, and Environmental Engineering. They can provide students with the foundations associated with different disciplines to build new concepts, theories, methods, and principles within this new discipline.

The adoption of interdisciplinarity by contemporary universities refers to their desire to utilize university education programs and research to serve the community, solve its problems and confront the challenges it faces. Alternatively, to be able to accommodate the market demands, programs need to be restructured, through integration and cooperation between different disciplines, to support interdisciplinarity.

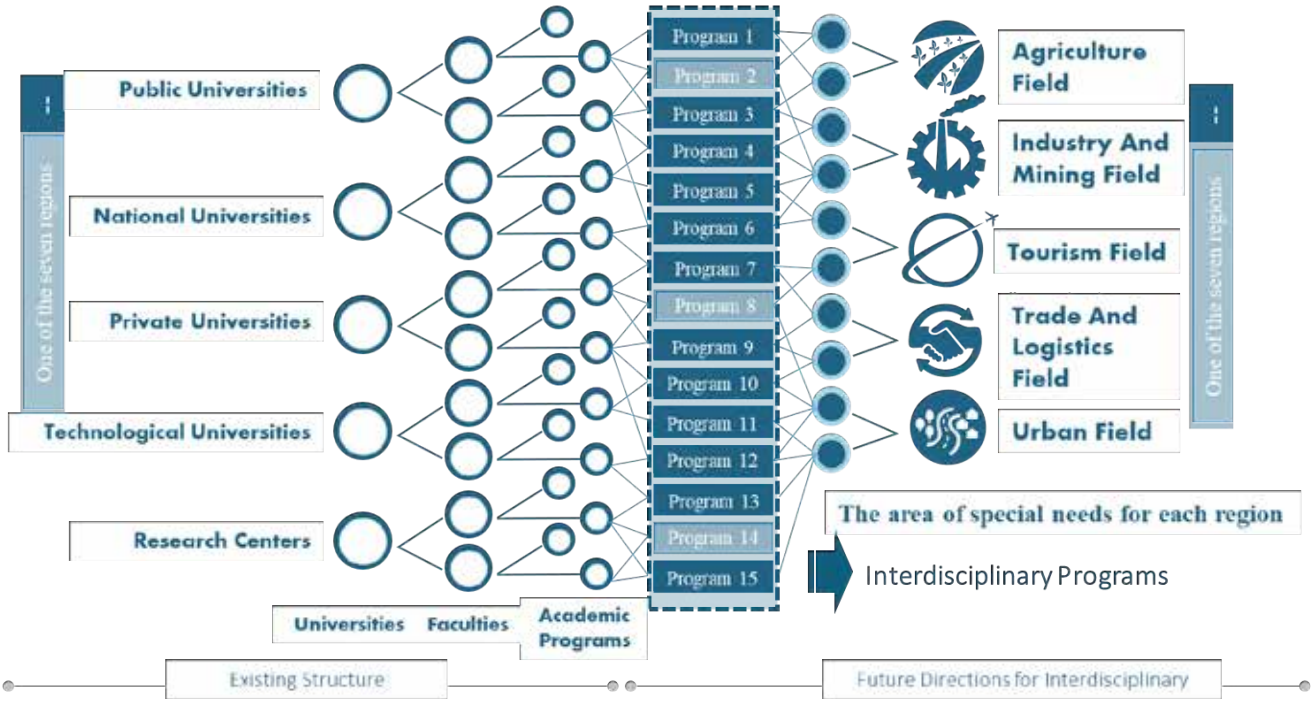


FIGURE (2 - 12) : THE NEW STRUCTURE FOR INTERDISCIPLINARY ACADEMIC PROGRAMS

These interdisciplinarity academic programs further seek to provide ways of complementary thinking across disciplines, leading toward more holistic understandings of how to bridge scientific, empirical, theoretical, and humanistic areas of study to answer important questions. Students will be specifically expected to develop the abilities to:

- Evaluate and deploy the validity of a variety of sources.
- Become aware of unexamined assumptions and think critically, complexly, logically, and ethically in order to make and defend an argument verbally and in writing using an evidence-based approach.

These programs can strive to produce creative, active thinkers equipped with interdisciplinary perspectives and the necessary professional skills to engage in a wide range of careers in a shared world. An important outcome of these proposed interdisciplinarity academic

programs is that they empower and are empowered by new kinds of faculty and undergraduate research that build connections that transcend traditional academic boundaries.

By using a wider perspective, we can create interdisciplinary programs by adopting both internal interdisciplinarity (programs created from the same domain, such as mechatronics and data sciences), and external interdisciplinarity (programs created across two or more domains, such as digital economy and fintech and bioinformatics).

MOHESR also should take into consideration borderline programs, which are programs in a certain domain that require the study of a considerable amount of knowledge from a different domain. Interdisciplinary programs may be operated on one campus or using a multi-campus setup. In the case of a multi-campus setup, each campus could incorporate programs from one faculty or from different ones.

This means structuring programs will be based on domains and not on faculties as mentioned in the previous section. Academic disciplines would be split into three main domains: the Humanities (languages, culture, and art), Technology (engineering, mathematics), and nature (life and health sciences).

This approach would facilitate the creation of interdisciplinary programs. In this model, technical structures, governmental, national, and private universities would all become a part of a bigger system designed based on academic disciplines. Grouping and specializing the academics in this system will open the horizon to transition into interdisciplinary innovation.

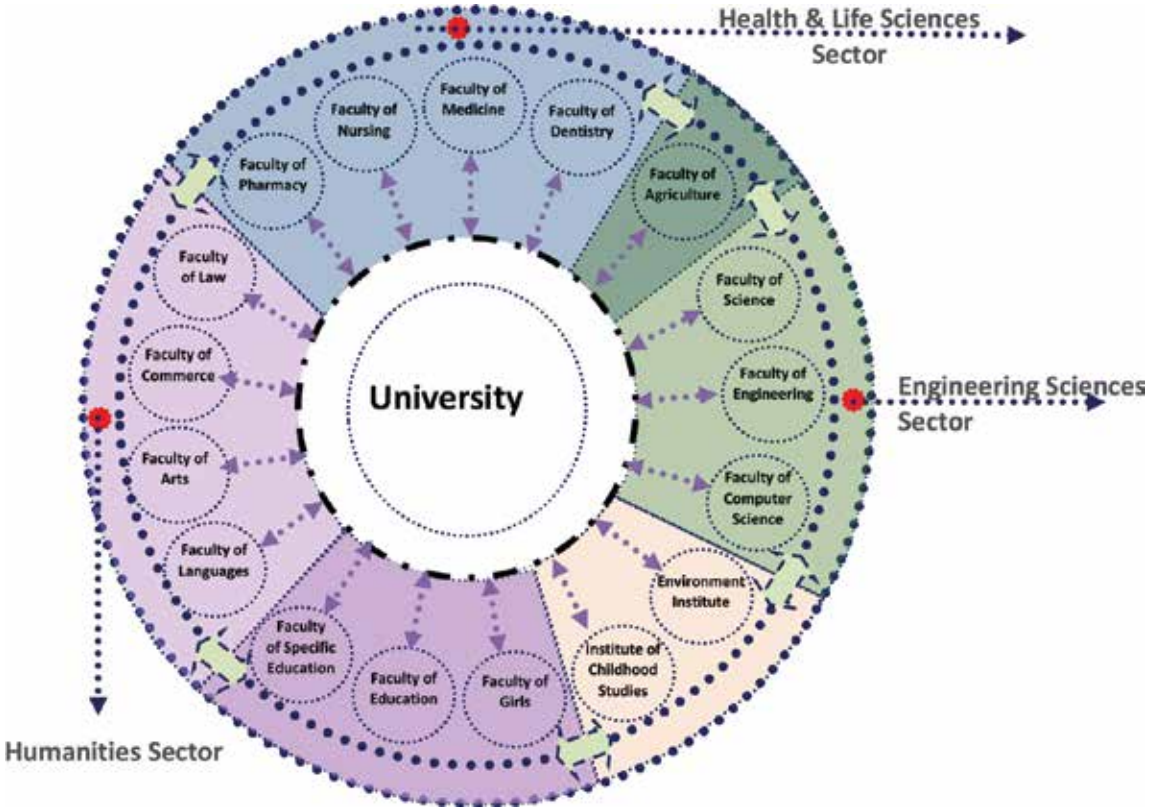


FIGURE (2 - 13) : ACADEMIC DISCIPLINES

2.5.2 Procedural Steps

The following procedural suggestions are proposed to facilitate the adoption of interdisciplinarity in Egyptian universities:

1. Formulating a national plan that includes the required interdisciplinary programs based on the problems and requirements of Egyptian society and in line with the Egyptian state's visions and strategic plans, through:
   - Listing the most important complex societal problems in various sectors of society.
   - Holding a dialogue among universities and research, industrial and production institutions to participate in identifying societal problems and

studying the possibility of forming partnerships that contribute to confronting these problems and addressing them.
    - Presenting the idea in the meetings of the Supreme Council of Universities and in the meetings of universities and faculty councils and discussing what universities can present in terms of interdisciplinary programs and research.
2. Modifying the vision and mission statements of Egyptian universities interested in moving towards interdisciplinarity to match the nature of this approach, through:
    - Ensuring the participation of specialized professors and researchers interested in the subject in formulating the university vision and mission.
    - Encouraging the participation of concerned sectors of society in setting the university vision and mission, such as representatives from the production sectors, business associations and investors, and benefiting from their field experiences.
3. Establishing relationships and partnerships between Egyptian universities and interdisciplinary foreign universities to benefit from their experience, through:
    - Interdisciplinarity joint research.
    - Student and faculty exchange.
    - Cooperation protocols and agreements.
    - Joint degrees and scholarships
4. Qualifying faculty members to deal with interdisciplinarity, through:
    - Developing training programs for faculty members to familiarize them with the importance of interdisciplinarity, and the mechanisms and requirements of its adoption in university programs.
    - Encouraging faculty members financially and morally to engage in interdisciplinary research teams.
    - Encouraging interdisciplinary joint research between faculty members from Egyptian and foreign universities.

2.6 IMPLICATIONS OF INTERDISCIPLINARITY

In Egypt, the 2030 Sustainable Development focuses on formulating several programs aimed at developing higher education. This includes expanding the establishment of HEIs in partnership with the private sector; developing a national map for the geographical distribution of current institutions based on specialization; expanding the establishment of new programs; and expanding the establishment of foreign universities that offer specializations that serve the labor market, thus reinforcing the concept of connectivity.

Universities can promote interdisciplinary work and collaboration between faculty, students, universities, and other research entities, providing financial support, professional and technical expertise, and special services and facilities to assist researchers. This perspective of interdisciplinarity supports the concept of integration that was previously addressed where universities become the incubators that support and adopt interdisciplinary programs.

Creativity and future readiness are prominent characteristics of these emerging interdisciplinary programs, driven by universities' commitment to addressing future research, educational, and economic demands, while envisioning a more progressive future. These interdisciplinary programs are designed to have useful applications in various aspects of life and to equip graduates with the skills required for a wide range of job opportunities. Creativity and future readiness open new horizons in the workforce, allowing for the effective utilization of graduates' skills and capabilities, thereby promoting positive economic development within society.

Furthermore, the adoption of an interdisciplinary approach contributes to addressing the concept of competitiveness. Entrepreneurs and higher education leaders recognize global competitiveness as a key driver for enhancing education and workforce capabilities. However, different ways of connectivity on different levels are required to achieve effective communication and collaboration that results in highly skilled educated individuals. It is therefore crucial to examine connectivity levels in order to create a learning environment that is inclusive and interconnected.

Arab Republic of Egypt

وزارة التعليم العالي والبحث العلمي

Ministry of Higher Education
& Scientific Research

3.
CONNECTIVITY

3.1 INTRODUCTION

Connectivity and regional and cross-border collaboration in higher education are an expanding trend. Opportunities for such collaboration are increasing, and collaborative cultures have improved. An increasing number of countries are initiating and participating in regional cooperation and cross-border collaboration as a strategy to strengthen their higher education systems. Still, higher education leaders generally believe that cross-border collaboration in higher education offers a promising mechanism for revenue generation, student recruitment, quality enhancement, and sometimes a way to improve research.

Connected networks can take on activities that would exceed the abilities of individual institutions. Connectivity is achieved at different levels. **The internal level** is between different HEIs and research centers in Egypt and involve physical connectivity, market sector and regional connectivity, while **the external level** focuses on communication and relationships with international partners. Both tracks are complemented by **virtual connectivity** through digital platforms and other tools for communication, collaboration, and data sharing. This enables researchers, faculty members, and students to connect virtually, regardless of their physical locations. Virtual meetings, video conferences, online collaboration tools, and shared digital platforms allow for seamless communication, exchange of ideas, and joint research efforts, promoting physical connectivity even when face-to-face interactions are limited.

The need for virtual connectivity has become prominent since the beginning of the COVID-19 lockdown. Since then, the MOHESR has been working on supporting researchers and post-graduate students through several webinars presented by the representatives of prestigious publishers in the Middle East and Northern Africa (MENA) region such as Clarivate, Elsevier, Emerald, Sage, and Wiley. Some of these webinars provide general information while others support specialized fields like medicine, engineering, and information technology. These webinars started in June 2020 and continue to share knowledge among early career researchers even after the end of pandemic-related restrictions.

Online video conferences have several benefits in addition to complying with campus social distancing policies. They can help widen the number of attendees who can join virtually at a convenient time and place and record notes. Another tacit benefit from spreading this culture among Egyptian scholars is to encourage further cooperation with international universities.

3.2 THE IMPORTANCE OF CONNECTIVITY

Connectivity has numerous benefits:

- Knowledge sharing and collaboration: Connectivity allows universities to share knowledge, expertise, and research findings more effectively. This collaboration can lead to innovative breakthroughs, advancements in various fields, and the development of new ideas and technologies.
- Research opportunities: Connected universities can pool their resources and expertise, providing researchers with access to a broader range of facilities, data, and research subjects. This expanded research network increases the potential for impactful discoveries and interdisciplinary studies.
- International perspective: Connectivity among universities fosters a global outlook by facilitating international collaborations and partnerships. This exposure to different cultures, perspectives, and approaches enhances academic diversity and promotes cross-cultural understanding.
- Student mobility and exchange programs: Connected universities often offer student exchange programs, study abroad opportunities, and joint degree programs. These initiatives enable students to broaden their educational experience, gain exposure to different academic systems, and develop intercultural competence.
- Faculty and staff development: Connectivity allows for faculty and staff exchanges, enabling them to gain new knowledge, skills, and teaching methodologies. This professional development enhances the quality of education and research within institutions.
- Access to resources and funding: Connected universities have better access to funding opportunities, grants, and resources. Collaborative research projects can attract more substantial funding, leading to improved facilities, equipment, and research support.
- Addressing global challenges: Universities can collectively tackle global challenges such as climate change, public health crises, and sustainable

development through collaborative research, sharing best practices, and joint initiatives.

- Reputation and rankings: Connectivity between universities can enhance their individual and collective reputation. Collaborative efforts and partnerships with prestigious institutions contribute to higher rankings and recognition within the academic community.
- Student recruitment and retention: Connected universities can attract a diverse pool of students due to their broader range of educational opportunities, research excellence, and international collaborations. This enhances student recruitment and retention rates.
- Economic impact: The connectivity between universities can have positive economic implications for the local and regional communities. Collaborative research and innovation often lead to the commercialization of new technologies, job creation, and economic growth.

3.3 TYPES OF CONNECTIVITY

Connectivity can be divided into two main types, internal and external connectivity, that are both linked by virtual connectivity and digital transformation which have catalyzed a paradigm shift in higher education. They have revolutionized higher education by providing transformative opportunities for students, educators, and institutions alike and facilitating lifelong learning, fostering innovation, and preparing students for the digital future. Through virtual connectivity, higher education has embraced online learning platforms, virtual classrooms, and digital resources that transcend the limitations of physical spaces. This shift has allowed students to access educational content from anywhere, at any time, fostering flexibility and inclusivity.

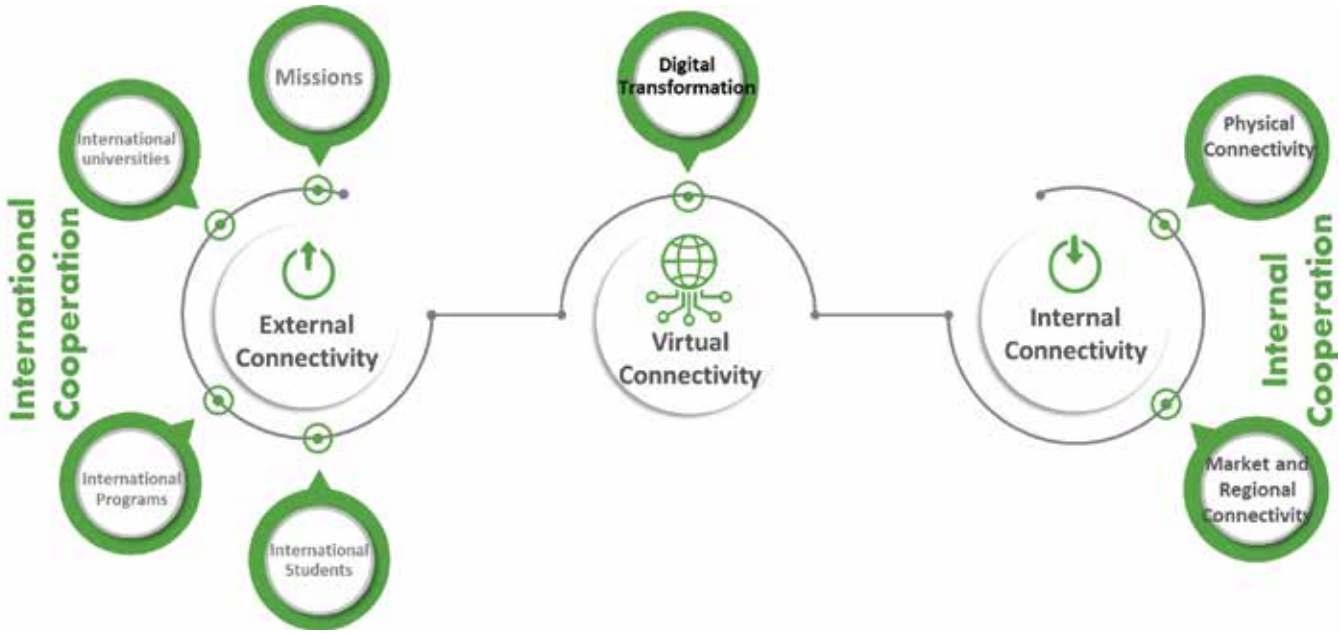


FIGURE (3 - 1) : TYPES OF CONNECTIVITY

3.3.1 Internal Connectivity

Internal connectivity within the higher education ecosystem encompasses two key dimensions: physical connectivity and market connectivity. By promoting internal connectivity, institutions can enhance the overall educational experience, improve outcomes for students, and strengthen their ties with broader society. It supports the integration of academia with real-world needs, fosters innovation and research collaboration, and empowers technology to create inclusive and interconnected learning environments.

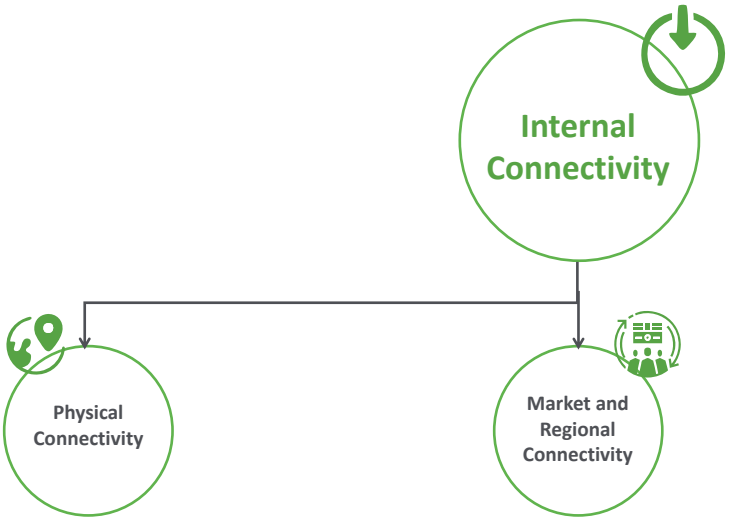


FIGURE (3 - 2) : INTERNAL CONNECTIVITY

3.3.1.1 Physical Connectivity

In today's interconnected world, higher education institutions play a crucial role in shaping the intellectual, economic, and cultural landscape of a region. A key aspect of fostering collaboration and knowledge exchange among universities is the establishment of physical connectivity. When universities in the same region are well-connected, it facilitates seamless communication, collaboration, and resource sharing, ultimately leading to enhanced educational outcomes.

Physical connectivity is the physical communication between alliance institutions at the level of the same region in terms of geographical convergence. It involves more than one partner institution in the same region collaborating to accomplish a particular activity such as curriculum redesign or implementation of a research study. These are networks that involve a number of institutions that come together to promote a particular issue on which universities find benefits in collaborating. They tend to be focused on a broader set of longer term, more sustainable set of relationships and activities.

Physical connectivity between HEIs at the regional level depends on geographical proximity which helps facilitate communication, cooperation, and the movement of human and material resources between members of all HEIs and research centers in the same region. It contributes greatly to improving the quality of education, fostering mutual understanding, and providing expanded opportunities for student mobility and the circulation of human capital. It also focuses on establishing and enhancing the infrastructure within HEIs. This includes providing accessible facilities to enable seamless movement and interaction among students, faculty, and staff.

This has been implemented and executed for 15 national universities and 10 technological universities and 45 technical institutes. The infrastructure that has been designed for the new-generation universities is based on the latest technologies and is compliant with international standards such as ISO 27001.

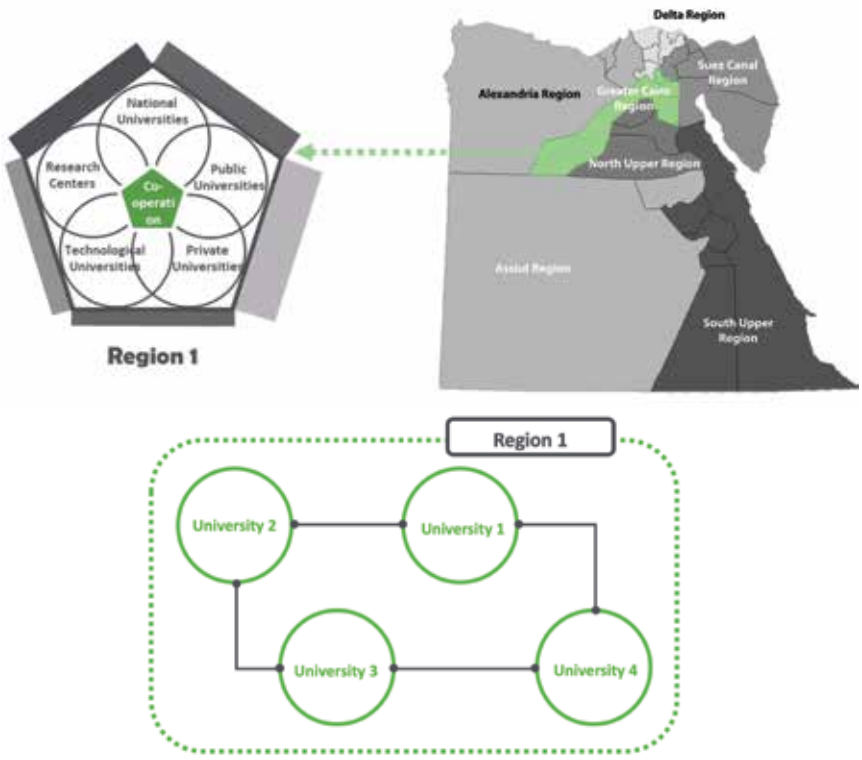


FIGURE (3 - 3) : AN EXAMPLE OF REGIONAL CONNECTIVITY AMONG HEIS

Physical connectivity activities within higher education institutions focus on creating a well-connected and accessible environment that promotes collaboration and engagement. Some common activities that are part of physical connectivity include:

- Joint research: Faculty members and researchers from different universities can work together on interdisciplinary projects through research centers. These centers can provide shared lab spaces, equipment, and resources, fostering innovation and knowledge exchange.

- Inter-university exchange programs: Comprehensive student and faculty exchange programs allow individuals to spend a semester or academic year at a partner university within the region. This promotes cultural exchange, encourages collaboration, and broadens perspectives.

- Cross-institutional course enrollment: Students have the opportunity to take courses at other universities within the region, expanding their educational opportunities. This requires the development of policies and systems to facilitate seamless credit transfers and ensure that course offerings are compatible across institutions.

- Shared libraries and resources: Agreements for sharing library resources, digital databases, and research publications among universities ensure that students and faculty members have access to a broader range of academic materials and facilitates collaborative research.

- Inter-institutional research grants: Funding opportunities specifically designed to support collaborative research projects between universities in the region can encourage faculty members to collaborate on research initiatives that address regional challenges and contribute to local development.

- Joint conferences and workshops: Joint conferences, workshops, and seminars can bring together researchers, scholars, and students from various universities and provide a platform for sharing knowledge, presenting research findings, and fostering interdisciplinary discussions.

- Networking and collaboration platforms: Online platforms or networks where faculty members, researchers, and students from different universities can connect and collaborate virtually can foster innovation and facilitate important research. This can include discussion forums, virtual research groups, and shared project management tools.

- Regional outreach and engagement: Universities can actively engage with the local community by organizing joint community service projects, volunteering initiatives, and outreach programs. This promotes social responsibility, strengthens regional ties, and showcases the positive impact of higher education on the surrounding region.

By implementing these physical connectivity activities, HEIs can create a learning environment that fosters collaboration, engagement, and a sense of community among students, faculty, and staff, ultimately enhancing the overall educational experience.

3.3.1.2 Market Sector and Regional Connectivity

Market and regional connectivity refer to the interactions between HEIs and industries, businesses, and market. It involves the ability of higher education institutions of each region to align their programs, curricula, and research with the needs of the job market and specific industries related to their region's potentials and challenges. This connectivity aims to ensure that graduates are equipped with the required skills, knowledge, and attributes to be well-prepared for contributing to the economic development of the region.

3.3.1.2.1 Why Strive for Market Connectivity?

After graduating from higher education, graduates enter the labor market with a diverse range of skills and knowledge. The scenarios for graduates in the labor market can vary depending on various factors, including their field of study, job market conditions, personal attributes, and career aspirations. Here are a few scenarios that graduates may encounter:

- **First scenario: Direct employment**
  Graduates secure employment directly related to their field of study by joining companies, organizations, or institutions that value their specific expertise. They can then apply the knowledge and skills gained during their education to contribute to their chosen profession or industry.

- **Second scenario: Career shift**
  Graduates face challenges in finding suitable employment immediately after graduation. This could be due to a competitive job market, lack of experience, or limited job openings in their desired field. It can also be attributed to initial lack of interest in their academic major resulting from the entry requirements for university admission process. In such cases, graduates may need to explore alternative career paths, gain relevant experience through volunteer work or part-time jobs, or consider expanding their job search to different locations or industries.

- **Third scenario: Unemployment**
  Graduates are unable to find opportunities to join the labor market, because there is no real demand for their field of study or because of their poor academic level.

- Other scenarios: this includes the option of graduates who opt to go into graduate studies and pursue additional post graduate degrees. Also, there is another sector that start their own businesses as entrepreneurs - those create jobs for themselves and others - or enter family run businesses. Additionally, there is a portion that goes to military service or females who opt to become housewives.

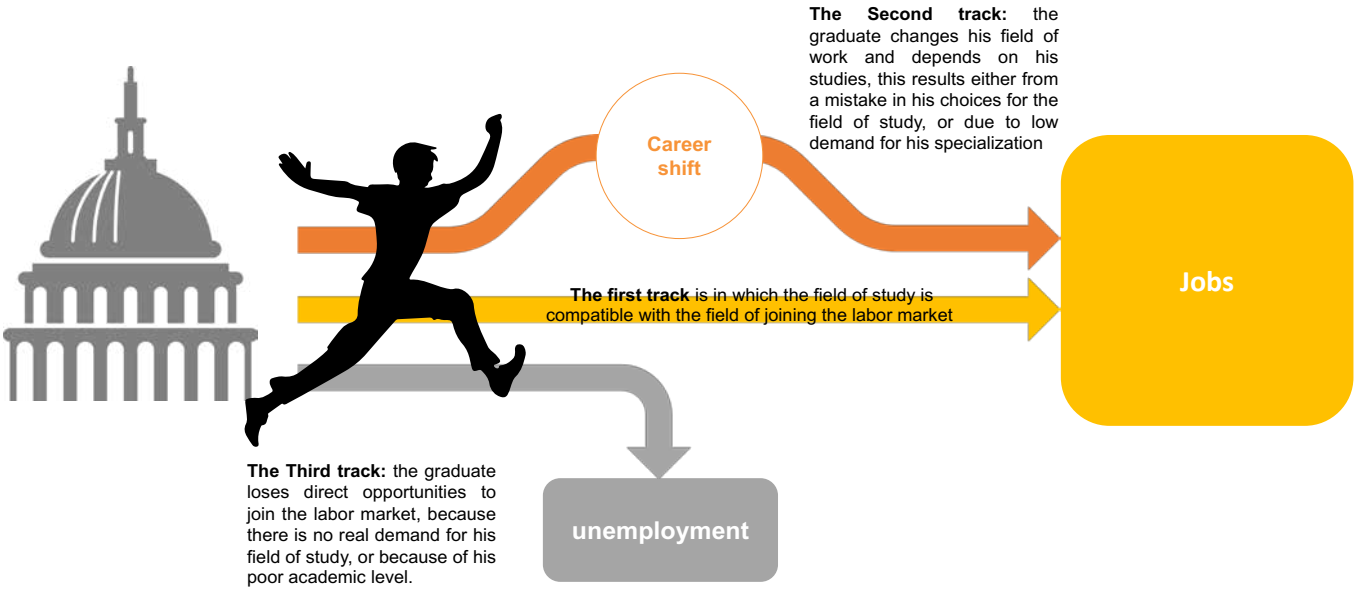


FIGURE (3 - 4) : SCENARIOS OF EMPLOYMENT FOR GRADUATES

These scenarios illustrate why connectivity between the market sector and universities has become increasingly vital in today's rapidly changing economic landscape. As the demands of the job market continue to evolve, academic institutions are recognizing the need to bridge the gap between theoretical knowledge and the practical skills required by industries. The synergy between the market sector and universities, fostered through enhanced connectivity, holds immense potential for driving innovation, shaping educational curricula, and nurturing a skilled workforce.

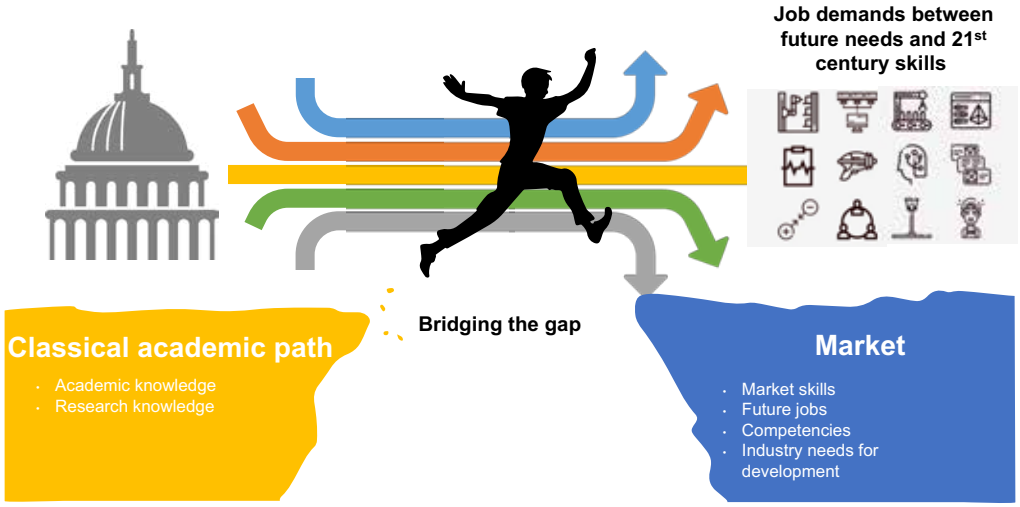


FIGURE (3 - 5) : BRIDGING THE CONNECTIVITY GAP

3.3.1.2.2 Mechanisms for Market Sector and Regional Connectivity

Market sector and regional connectivity can be achieved through several strategies and initiatives.

- Collaborative knowledge exchange

  Connectivity between the market sector and universities enables a dynamic exchange of knowledge and expertise. Academic institutions possess a wealth of theoretical knowledge, research capabilities, and analytical skills, while the market sector brings real-world insights, industry trends, and practical experience. Through collaborations, universities can power the expertise of industry professionals, gaining valuable insights into the latest market demands, emerging technologies, and industry best practices. In turn, academic institutions can contribute their research findings, cutting-edge theories, and innovative approaches,

fostering a mutually beneficial exchange that fuels innovation and intellectual growth.

- Industry-relevant curricula
  By actively engaging with industry partners, universities can gain firsthand knowledge of the obstacles faced by businesses and industries. This insight allows academic institutions to adapt their curricula, research projects, and training programs to equip students with the necessary skills and competencies demanded by the market. By addressing industry challenges collaboratively, universities can produce graduates who are better prepared to tackle real-world problems, making them highly sought-after by employers, enhancing their employability and facilitating a smoother transition into the workforce.

- Fostering entrepreneurship and innovation
  Connectivity between the market sector and universities creates an environment conducive to entrepreneurship and innovation. By collaborating with the market sector, universities can provide aspiring entrepreneurs with mentorship, industry connections, and access to resources that facilitate the successful launch of startups. Additionally, industry partnerships can support innovation hubs and incubators on campus, encouraging students and faculty to develop and commercialize their research findings. Fostering innovation is the initial step, where researchers develop new technologies or products. These innovations may be at various Technology Readiness level (TRL) stages. Then, entrepreneurship comes to pave the way for commercialization and market entry by engaging with potential customers, securing partnerships, and conducting market research. This phase contributes to determining the market readiness level (MRL) of the innovation. MRL is a measure of the extent a product or solution is ready to meet the market challenges through four main components which are the competitive supply, customer, demand, and product readiness.

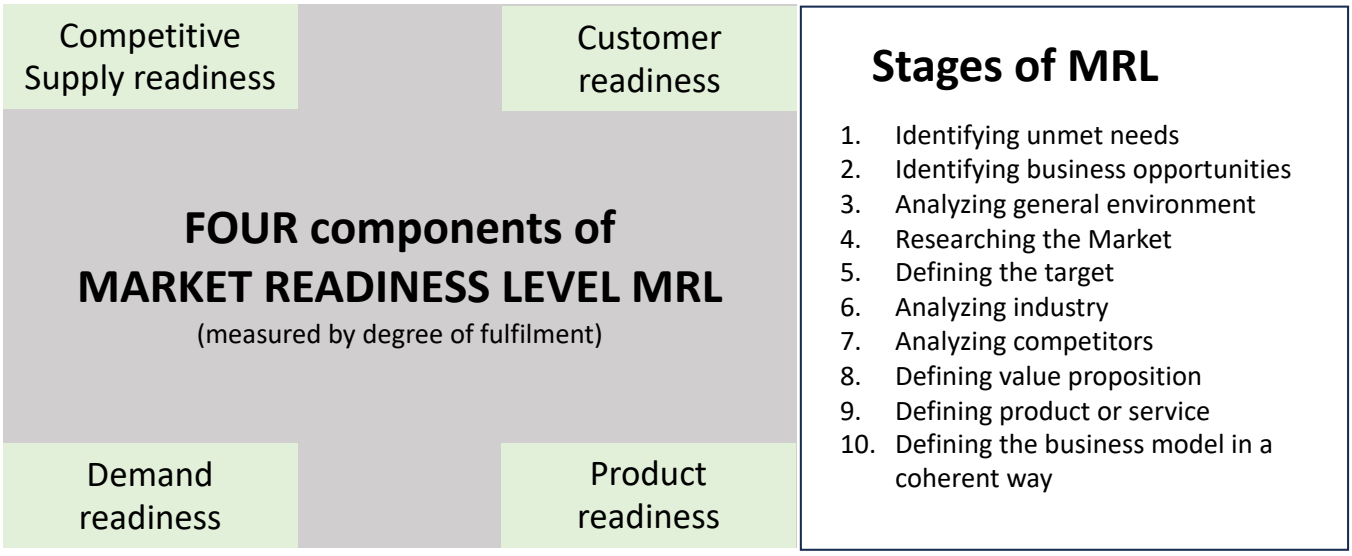


FIGURE (3 - 6) : MRL COMPONENTS AND STAGES

- Economic development and industry partnerships
  Connectivity between the market sector and universities is a catalyst for regional economic development. By actively engaging with local businesses and industries, academic institutions can forge partnerships that stimulate economic growth. Through research collaborations, technology transfer, and industry-sponsored projects, universities contribute to innovation and the creation of new industries. Moreover, industry partnerships provide opportunities for job placements, internships, and networking, strengthening the connection between education and employment.

The following figure shows a scenario of connectivity at the level of common market areas between different regions. This creates new opportunities for cooperation between HEIs at the regional level. The connectivity between different institutes on the regional level can happen when a region is more specialized in a specific economic activity and can act as the expert for the other regions.

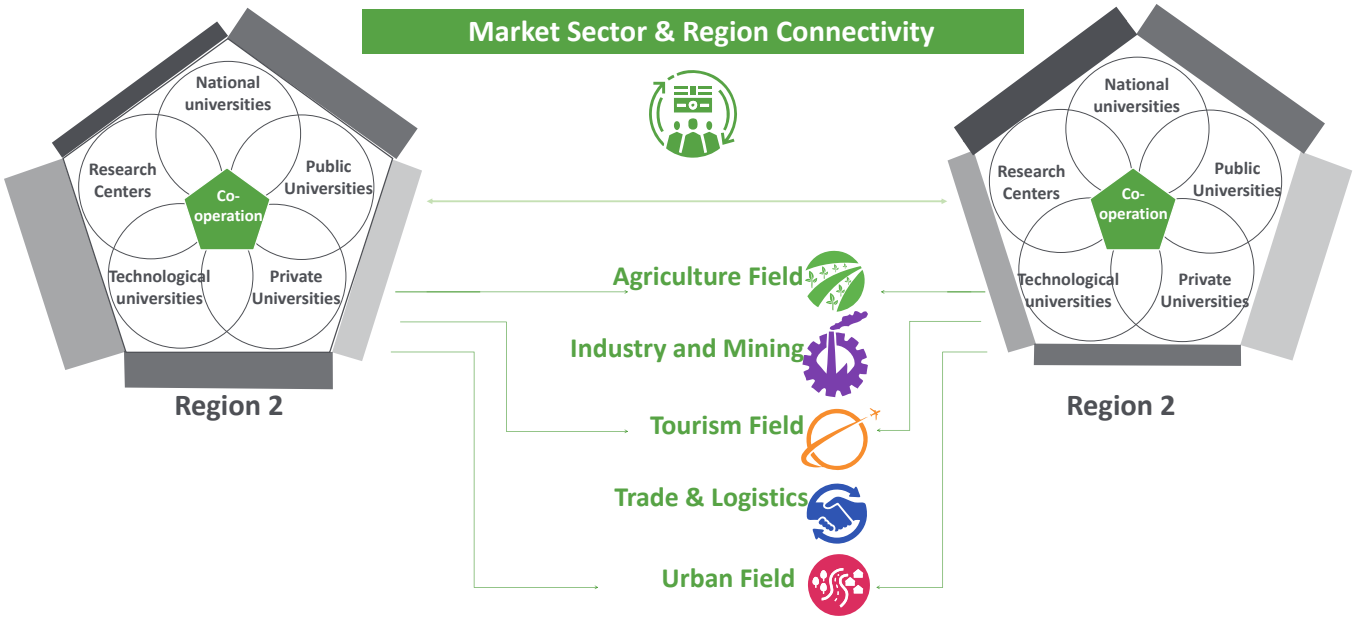


FIGURE (3 - 7) : SCENARIO FOR REGIONAL AND MARKET CONNECTIVITY

The following figure shows how regional connectivity can fulfill market needs building on specializations within each region.

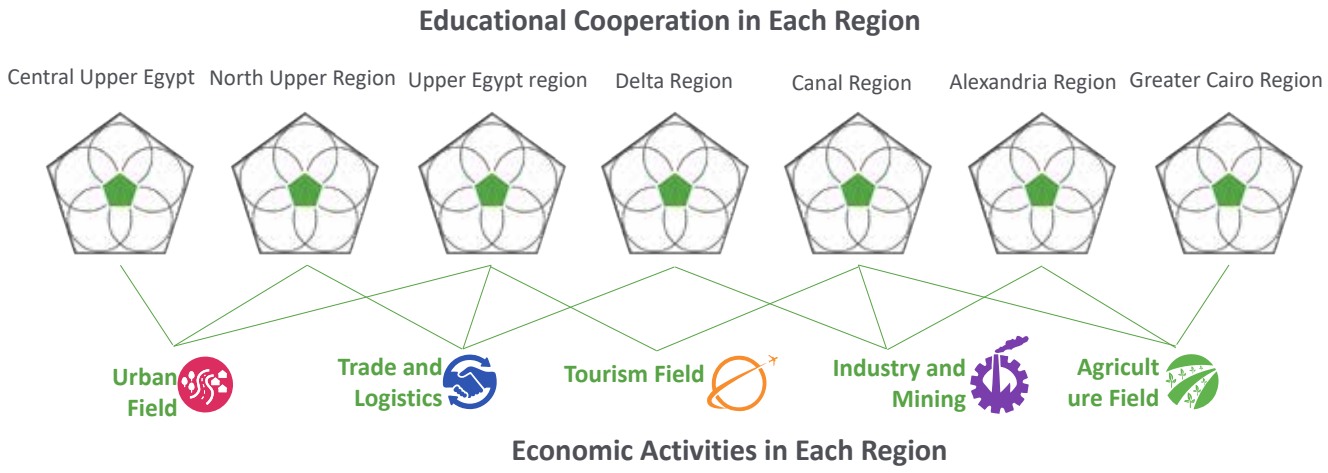


FIGURE (3 - 8) : REGIONAL CONNECTIVITY AND ECONOMIC DEVELOPMENT

3.3.1.2.3 Roadmap for Market Sector and Regional Connectivity

The roadmap for market sector and university connectivity involves a strategic approach to foster collaboration, enhance communication, and create meaningful partnerships based on the vision articulated in the following figure:

Each of the three pillars involves several steps explained below.

The vision for linking, training and qualifying for the labor market in the national strategy for higher education and scientific research consists of three pillars

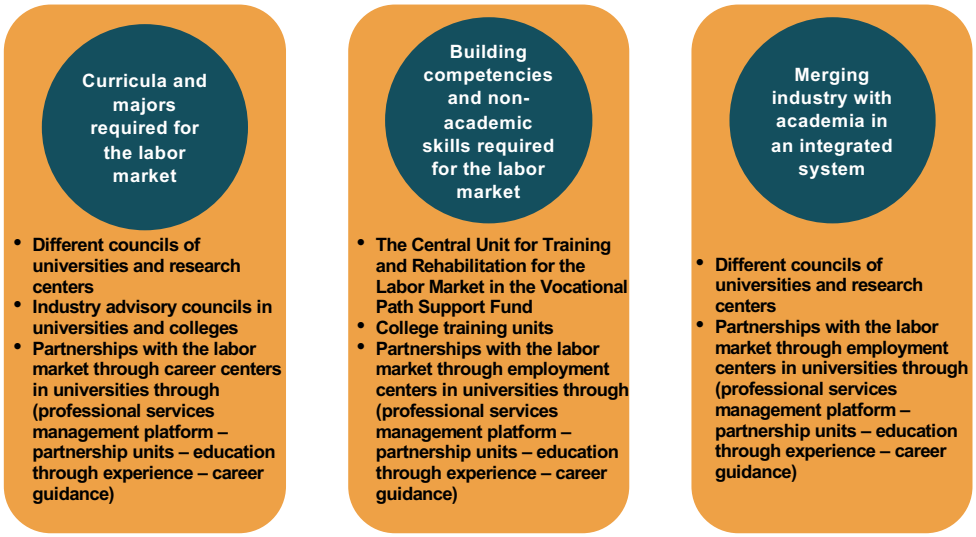


FIGURE (3 - 9) : THE VISION FOR MARKET SECTOR AND REGIONAL CONNECTIVITY

A. Curricula and majors required for the labor market

- Identify industry needs: Conduct surveys, interviews, and industry-focused workshops to identify specific needs, skill gaps, and emerging trends within the market sector. This information will help shape the development of targeted programs and initiatives.
- Align curricula with market demands: Collaborate with industry partners to align educational curricula with current and future market needs. Integrating practical training, industry-specific projects, internships, and apprenticeship programs into the curriculum can provide students with relevant skills and hands-on experience.
- Establish industry advisory boards: Establish industry advisory boards composed of professionals from different sectors to provide guidance, industry insights, and recommendations for curriculum development, research focus areas, and internships or job placement opportunities.
- Pending university administration: through University Center for Career Development (UCCDs) at each university runs 2 Employer Round Tables (ERTs) per year to seek feedback and needs of industry and get firsthand information from employers in the Governorate.

B. Building competencies and non-academic skills required for the labor market

Curriculum design: Review and update University curricula to align with the evolving demands of the labor market. This includes incorporating courses or modules that focus on developing specific competencies and non-academic skills, such as communication, critical thinking, problem-solving, teamwork, and leadership.

- Soft skills training: Provide training programs and workshops focused on developing non-academic skills like communication, teamwork, problem-solving, leadership, and adaptability. These sessions help students enhance their interpersonal skills, emotional intelligence, and professional etiquette. Career Centers (UCCDs) facilitators are trained to run employability skills programs offering a set of soft-skills matching market needs.
- Student organizations and clubs: Encourage students to join and actively participate in student organizations, clubs, and societies to foster skills development. These groups offer opportunities for leadership roles, teamwork, event management, public speaking, and networking, which contribute to the development of competencies and non-academic skills.

C. Merging industry with academia in an integrated system

Stakeholder engagement: Engage relevant stakeholders from both the market sector and universities, including industry representatives, academic leaders, faculty members, and students, and establish a collaborative platform for ongoing dialogue and exchange of ideas.

- Encourage industry experts as guest lecturers: Invite different industry experts to deliver guest lectures, workshops, and seminars to students. The industry experts' contribution could be extended to share in preparing curricula for special programs that match market needs. This allows students to gain insights directly from practitioners and understand the practical applications of their knowledge. This can include practical case studies, Practical-Learning-Component programs, industry-related graduation projects, and coop programs.
- Promote research collaborations: Facilitate research collaborations between universities and the market sector. Establish mechanisms for joint research projects, grants, and funding opportunities that encourage partnerships and knowledge exchange.
- Create internship and co-op programs: Develop structured internship and co-op programs to provide students with opportunities to work in the market sector. creating partnerships with companies and organizations can offer meaningful internships that align with academic disciplines.
- Establish technology transfer and commercialization: Create avenues for technology transfer and commercialization of research findings and develop mechanisms for protecting intellectual property rights and establishing licensing agreements between universities and industry partners.

Initiatives and actions are needed to support this roadmap. For example, a career and employment fund for university students will be established to provide a set of integrated services to support the professional path of students and graduates of Egyptian universities and institutes affiliated to the MOHESR. It seeks to link them to the labor market, through affiliated units, learning programs, vocational guidance, experiential learning, industry partnerships, employment forums, and a database of labor market and service platforms to support career paths. It also provides analysis of data to support the development of curricula and academic regulations.

Initiatives of **upskilling and reskilling programs** play a key role in improving graduate employment rate. This is by integrating the basic needed skills to create calibres capable of competing in the marketplace. Both programs are important to ensure that graduates attain the relevant job requirements and equipped with technological advancements which are continuously evolving. This helps to adapt to changes in the job market and mitigates unemployment risks. The Up-Skill Program for both undergraduate and postgraduate students can provide competent calibres in the job market through developing interpersonal, intrapersonal, innovation, entrepreneurship, scientific research, and employability skills. Then, guiding students to choose a career path to meet with their capabilities and empower them to compete in the job market is important. With the uprising evolution in future jobs, reskilling is inevitable to address the shift in job market demands and compete within the global market.

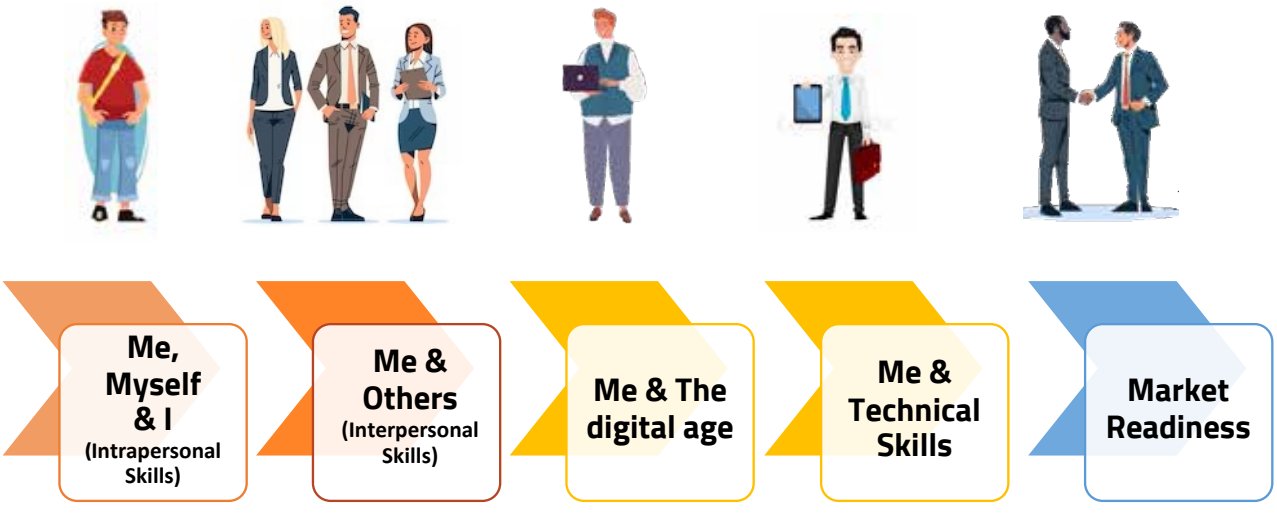


FIGURE (3 - 10) : STAGES FOR THE UPSKILLING PROGRAM

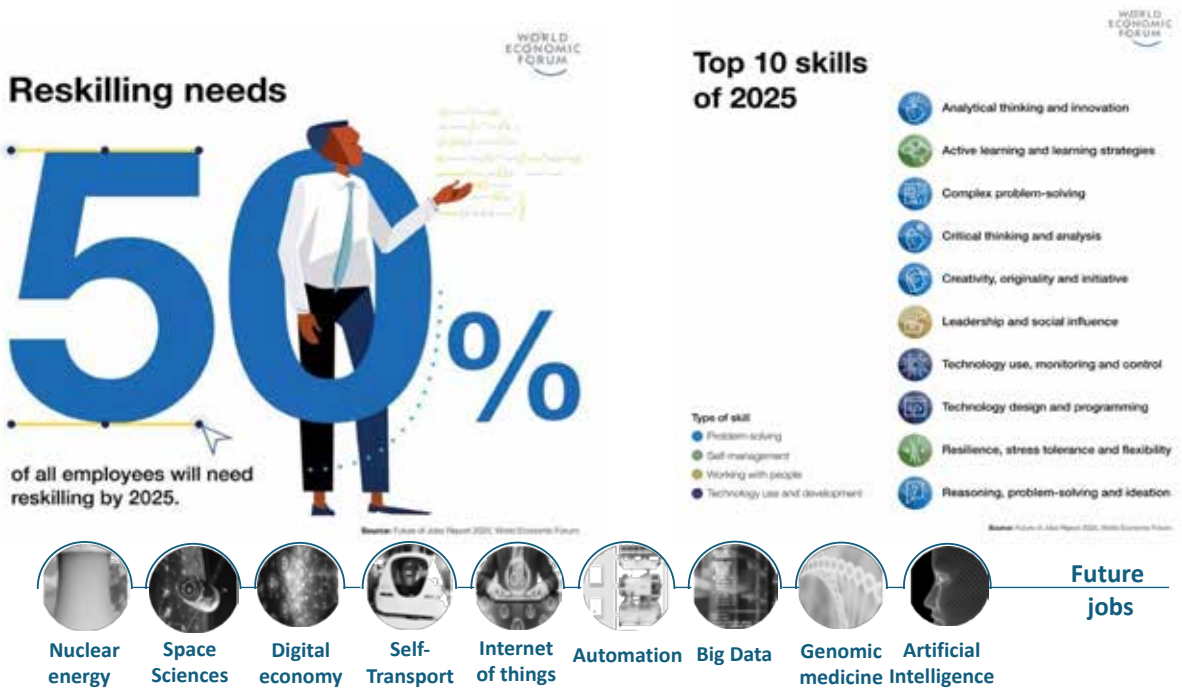


FIGURE (3 - 11) : RESKILLING NEEDS BY 2025 (WORLD ECONOMIC FORUM)

The implementation arms for these programs are the innovation hubs, training and development centers, and career centers. These arms when integrated can:

- create a comprehensive ecosystem that supports both upskilling and reskilling initiatives.
- ensure that reskilling initiatives are relevant to industry.
- promote a culture of lifelong learning and continuous skill development.

3.3.1.3 Career Centers: A System for Developing Professional Skills for Employment

Career centers play a vital role in guiding and supporting students' career development. They provide resources and tools for self-exploration, helping students understand their interests, values, strengths, and personality traits. They also offer career assessments or inventories to help students gain insights into potential career paths that align with their individual attributes.

Career centers provide a range of services and programs, such as career advising, connecting with employers, internship programs, career-development workshops, employability skills programs, career-related events, labor-market surveys and resources for students and alumni. Their physical spaces include individual advising rooms, meeting areas for workshops and events, a resource library, and computer workstations with internet access for job searches and research. They offer a team of qualified professionals with expertise in career advising, career opportunities, and industry knowledge. This team may include career facilitators, employer relations specialists, and administrative staff who can provide personalized guidance and support to students. They are equipped with updated technology and resources that support career development such as informal career assessment tools, job boards, industry databases, virtual career resources, and resume writing, interview preparation, and networking.

Career center activities include:

- Organizing career fairs, networking events, information sessions, industry-talks, and panel discussions that bring students and employers together. These events provide students with the opportunity to meet industry professionals, explore career options, expand their professional

network, and gain insights into industry trends.

- Offering one-to-one advising sessions with trained professionals who can provide personalized guidance and support. These sessions can help students explore different career options, discuss their aspirations, and receive advice on educational paths, skill development, and job search strategies.
- Conduct career-development-workshops on diverse career topics including but not limited to job search, career planning (including self-assessment), resume writing, interviewing techniques, and personal branding. They can also assist with graduate-study search.
- Assisting students in finding internships, cooperative education opportunities, and volunteer and part-time jobs relevant to their field of study. They maintain relationships with employers and organizations to connect students with valuable experiential learning opportunities.
- Career Center (UCCD) staff can collect and analyze labor market information including employment surveys, tracer studies, employer-roundtables and enterprise surveys.

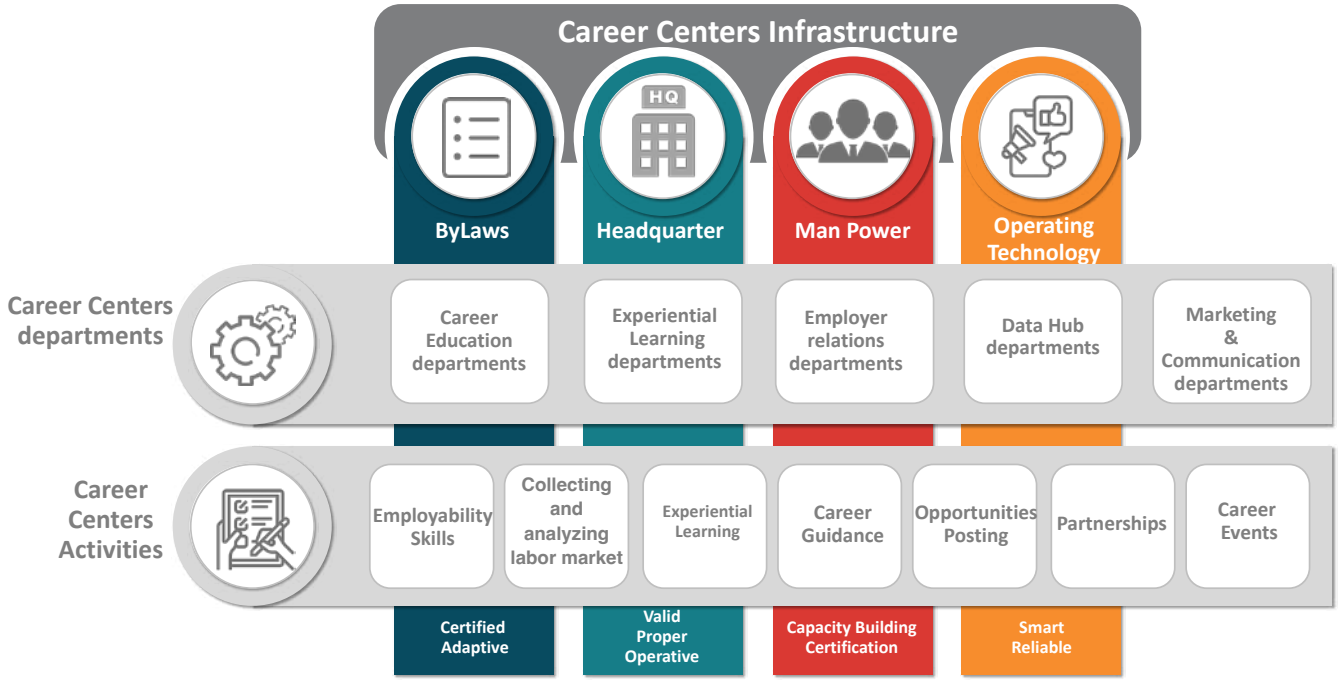


FIGURE (3 - 12) : CAREER CENTER INFRASTRUCTURE

There are career centers across universities throughout Egypt's different regions. The University Centers for Career Development (UCCD) project, which is funded by USAID and implemented by the American University in Cairo (AUC), aims to establish and operate career development centers to help students and graduates plan their career paths in the labor market and help them acquire the required skills. In its extension, the project will include nine Egyptian public universities, in addition to three technological universities (Bani Suef Technological University, Delta Technological University, and New Cairo Technological University), and four not-for-profit universities (Galala International University, King Salman International University, New Mansoura University, and Alamein International University) to reach a total of 46 UCCDs in 34 partner Egyptian universities by the end of 2026. To-date, 28 UCCDs have been established in 20 universities.

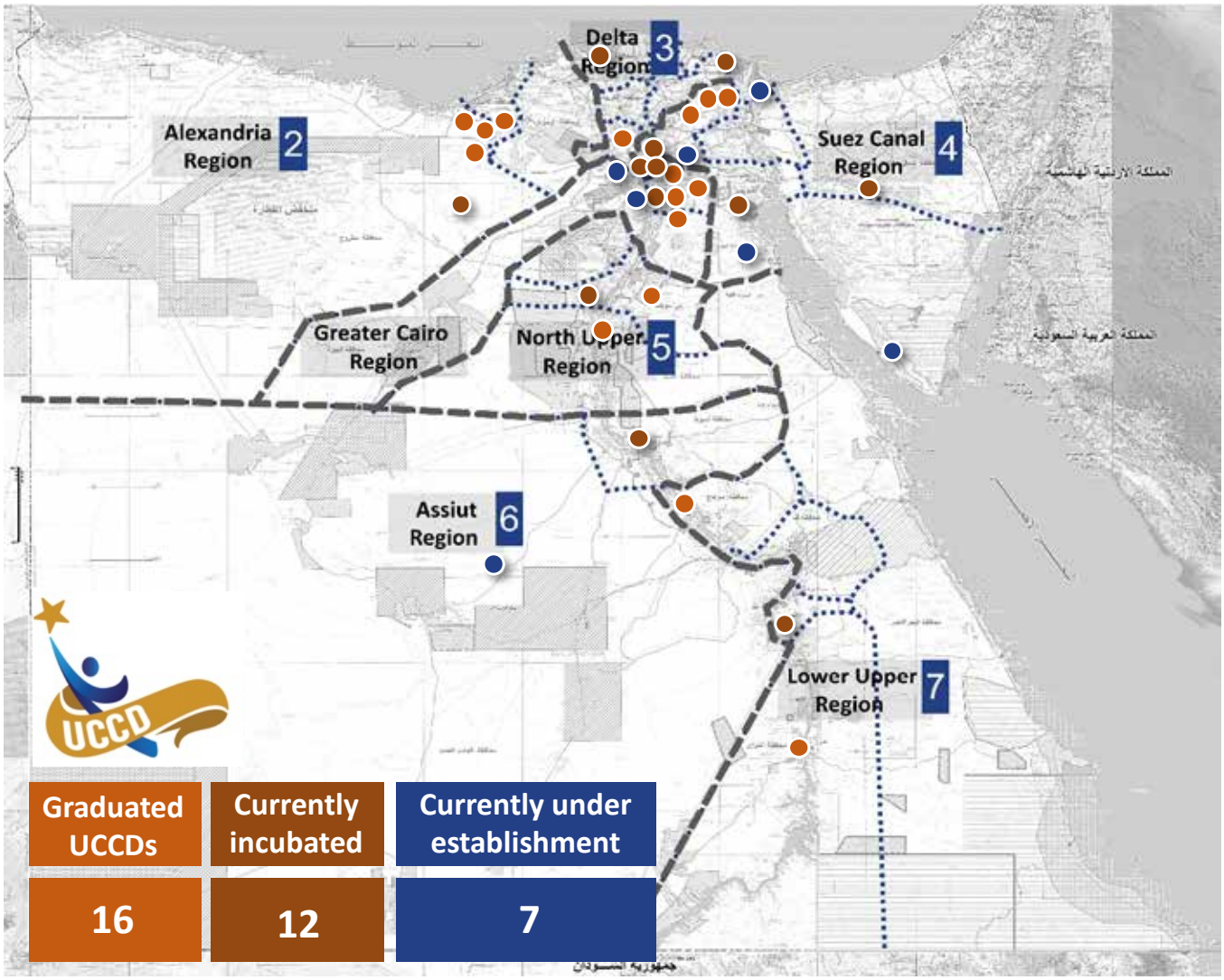


FIGURE (3 - 13) : UCCDS ACROSS EGYPTIAN UNIVERSITIES

Career center staff offer career advising as well as facilitate access to mentors and career advisors who can guide students in identifying their strengths, setting career goals, and developing a personalized roadmap for skills development. Mentors can offer insights, advice, and support, while career advisors can provide resources, guidance, and workshops on skills development and career planning. Career centers also provide comprehensive support to students, helping them make informed career decisions, develop the necessary skills, and successfully transition into the labor market.

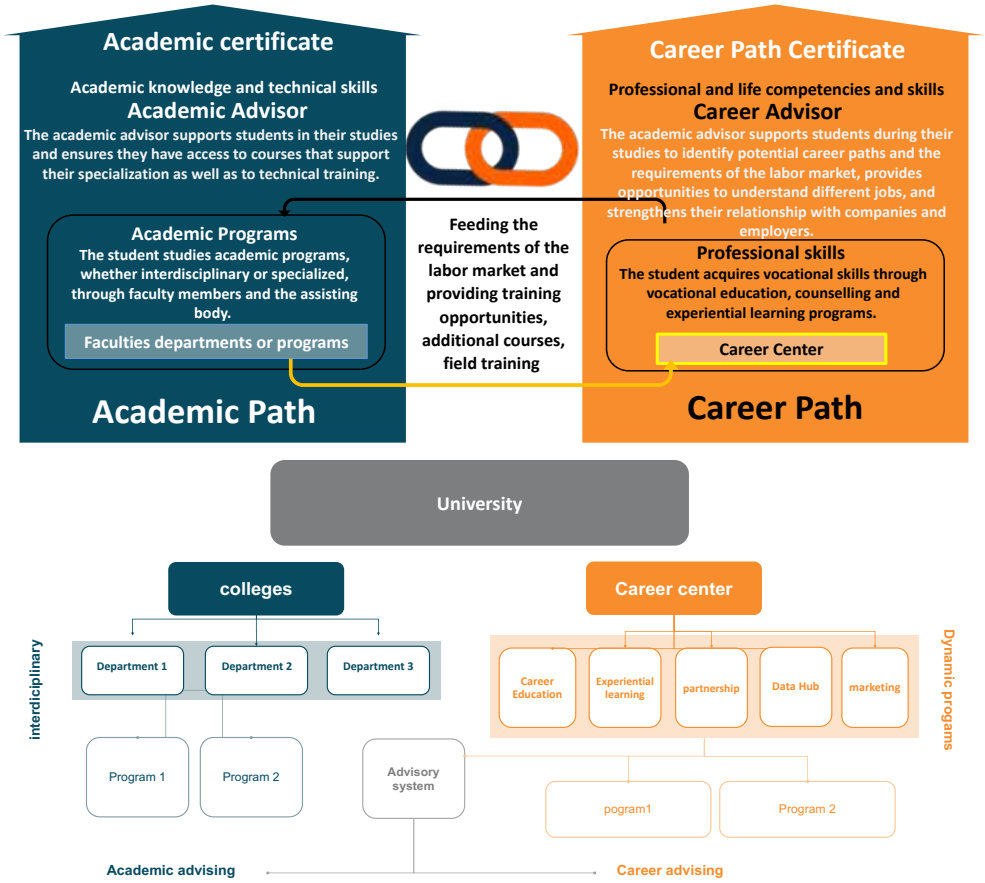


FIGURE (3 - 14) : ACADEMIC PATH VS. CAREER PATH

3.3.2 External Connectivity

External connectivity refers to the engagement and partnerships established between universities and international academic institutions, research centers, and international organizations. This international connectivity plays a crucial role in fostering global collaboration, promoting knowledge exchange, and enhancing the university's international reputation. The figure illustrates 4 mechanisms to establish external connectivity:

FIGURE (3 - 15) : MECHANISMS OF EXTERNAL CONNECTIVITY

3.3.2.1 International Students

Egyptian universities offer various facilities and support services for international students to ensure a comfortable and enriching educational experience.

- Universities offer a range of student support services, including academic advising, counseling, health services, and career guidance. International students can access these services to address their academic, personal, and career-related needs.
- The "Study in Egypt" admissions platform is a marketing platform with rich multimedia content to guide students choosing what and where to study in Egypt. The platform is continuously updated to keep pace with the growing interest in study paths in Egypt and provide the most up-to-date information on the spectrum of services available.
- The "Study in Egypt" program also has official accounts on various social networking platforms (Facebook, Twitter, Instagram, LinkedIn, TikTok), in addition to the "Study in Egypt" channel on YouTube.
- Workshops are held for university coordinators dealing with international students in Egyptian universities to localize the electronic admissions platform "Study in Egypt" and continuously introduce updates to the application mechanism.
- New services have been provided as well through cooperation with the EKB (Egyptian Knowledge Bank) and its partners such as Clarivate, Knowledge E, Elsevier, and Springer to make them available to international students.
- Scholarships and grants have played an enormous role in the mobility of students and researchers attracting more international students and offering more opportunities for student exchange. This has also been achieved by increasing the financial allocations for scholarships for the MOHESR in the sub-committee at the Ministry of Foreign Affairs. The ministry also hosts a delegation from the Passport and Immigration Department four days a week at the headquarters of the Central Administration for International Student Affairs to provide free residency renewal services to foreign students who are granted scholarships.
- Egypt offers – in both undergraduate and postgraduate studies – 1028 scholarships through executive programs, 564 scholarships through the Egyptian Ministry of Foreign Affairs, and 63 scholarships for Arabic language learners. Consolidating this praxis and supporting the high number of students who are granted these scholarships is a game changer as it encourages active student mobility and cultural exchange between Egypt and the world.
- Egypt has also granted international students an exceptional privilege, accepting to reduce the standard program tuition fees in several programs of its universities as approved by the Council of Ministers. This important step has been taken to reach more students all over the world and share the Egyptian higher education success story across the world.

3.3.2.2 International Programs

The MOHESR has devised a plan to foster diversity and competitiveness among universities by offering a range of educational opportunities in international universities located within Egypt. The objective is to enhance the synergy between national educational institutions and advancements in higher education and technological research, while also benefiting from the knowledge and experiences gained from international collaborations. There are two types of programs: in-country and blended. The in-country programs include five types of institutions:

- C1 Overseas/Offshore branch campuses: These are run and managed directly by the home institution offering programs and degrees.
- C2 Franchise: The home institution licenses a local institution to offer its programs.
- C3 Credit validation: Credit is transferred between institutions by applying to transfer course credit after it has been assessed for equivalency.
- C4 Dual degree: Students enrolled in one program can simultaneously earn a degree from the other without relocating.
- C5 Joint degree: A new program where students receive one certification with the badge of both collaborating institutions.

While the blended programs include 4 types:

- B1 Twinning: Credit transfer without question has already been certified between institutions by means of memorandums of understanding (MoU),
- B2 Fly- in/fly-out: Some courses are taught exclusively by faculty from the home institution who are sent out to the local site, while other courses may be taught by local staff.
- B3 Double degree: Students earn two degrees but spend time at both institutions. The mobility of staff and students vary based on program.
- B4 Articulation agreement: Host country students who have completed a specified curriculum are allowed to apply and enroll (advanced standing).

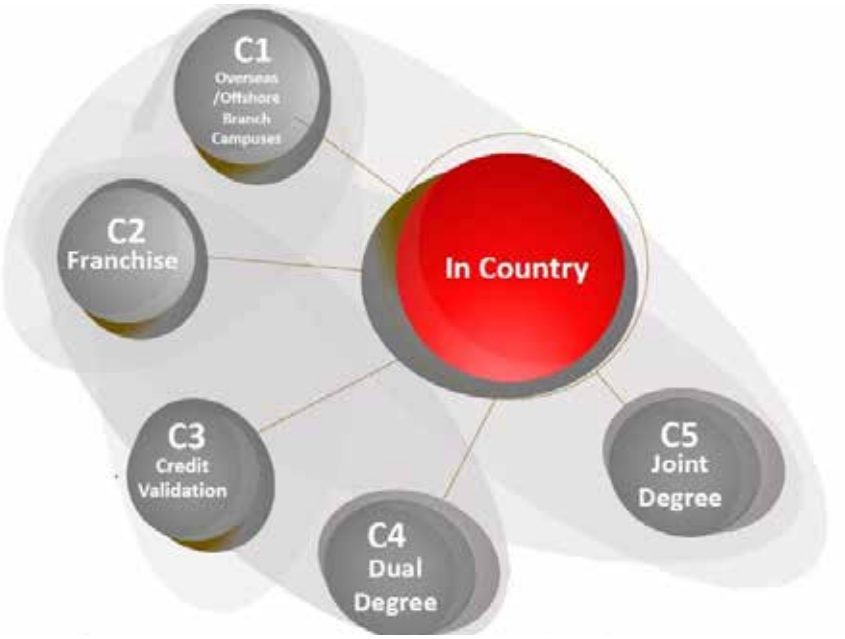


FIGURE (3 - 16) : IN-COUNTRY PROGRAMS

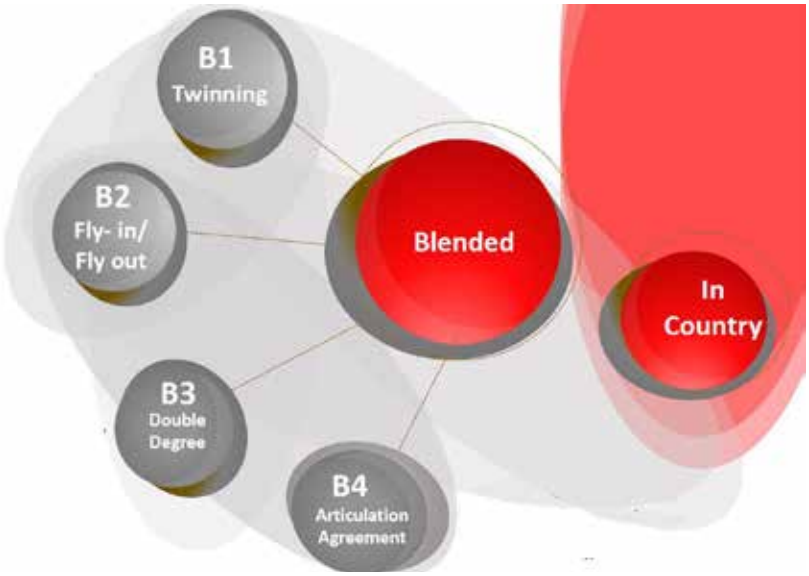


FIGURE (3 - 17) : BLENDED PROGRAMS

Numerous educational institutions have been established in the new administrative capital that host branches of prestigious foreign universities in Egypt as Overseas/Offshore branch campuses with franchise programs. These include as examples:

- The Canadian Universities Foundation in Egypt: It hosts the two branches of Prince Edward University and Ryerson University.
- The International Knowledge Universities Foundation: It hosts Coventry University.
- The global academic foundation: It hosts the University of Hertfordshire.
- The European Universities Foundation in Egypt: It hosts a branch for London University and Lancashire University.
- German International University.

In addition, various educational institutions established in the Cairo host dual degrees of prestigious foreign universities in Egypt. They include:

- The British University with London Southbank and Queen Margaret University as a dual degree program.
- Ain Shams University and the University of Stuttgart as a double degree-fly-in/fly-out program.

- Campus El Gouna and Technische Universitat Berlin on the Red Sea in Egypt as an Overseas/Offshore branch campus with fly-in/fly-out programs.
- University of East London and Ain Shams University have a Credit Validation/ Articulation Agreement, dual degree program and fly-in/fly-out program.
- Universita Mediterranea Italy and Ain Shams University have an Articulation Agreement and twinning programs.

In al-Galala City, al-Galala University has cooperation agreements with Arizona State University and Hiroshima University for dual degree, Articulation Agreement, and twinning programs. In al-Alamein city, al-Alamein International University has cooperation agreements with the University of Louisville for dual degree, Articulation Agreement, and twinning programs.

3.3.2.3 Foreign/ International Universities

Establishing connectivity with foreign universities involves a systematic roadmap with various steps to facilitate collaboration, exchange, and partnerships:

- Faculty and student exchange programs: Develop exchange programs that allow faculty members and students to spend a semester or academic year at partner universities.
- Joint research and funding opportunities: Encourage collaborative research projects between faculty members from Egyptian universities and partner universities. Explore funding opportunities, both internal and external, to support joint research initiatives and international research collaboration.
- Collaborative workshops and conferences: Organize joint workshops, seminars, and conferences with partner universities to facilitate knowledge exchange and foster intellectual discussions. These events can focus on specific research areas, emerging trends, or interdisciplinary topics of mutual interest.
- Virtual collaboration and online learning: Leverage digital platforms and technologies to facilitate virtual collaboration between faculty members, students, and researchers from partner universities. Explore opportunities for joint online courses, webinars, and virtual research projects.

3.3.2.4 Missions

The Central Department of Missions (CDM) is a key contributor to qualifying and growing needed human capability. CDM is a central department within the Sector of Culture Affairs and Scientific Missions (CASM) in the MOHESR. CDM is responsible, by law, for managing the government's allocated yearly budget for studying abroad. The CDM's main duty is to develop, operate, and monitor scholarship programs and to dispatch scientific missions around the world either to obtain scientific degrees (PhD, MSc, etc.) or to receive short, focused training. Historically, CDM operation was based on assigning each university and research institute a set of scholarships to use for building their human capacity. Since 1982, a new operational model was established by which a 5-year dispatching plan is centrally developed in cooperation with all stakeholders including universities and research institutes. Each 5-year plan has a specific overarching theme that supports the achievement of national goals.

In July 15, 2020, a new dispatching Law 149 for Year 2020 was issued. It unlocked new opportunities for scholarships and attempted to remedy some of the gaps in the previous law. In particular, the new law gives the CDM the ability to dispatch undergraduate students to study abroad for one semester or one year and transfer the studied credits to their home university in Egypt. The law also allowed CDM to grant scholarships for employees and researchers with temporary contracts in universities, ministries, and research institutes. Moreover, the new law allows for designing any needed study, research, or training programs that can support national needs and goals.

It is crucial that CDM exploits the flexibility and agility of the new dispatching law and ensure that the new plan is aligned with the new strategic vision of MOHESR. In addition, it is important to revise the status quo of CDM scholarships and understand the various issues that have affected the realization of the objectives of previous CDM plans.

The following figure shows the distribution of granted scholars currently abroad by scholarship types. The analyzed types include:

- fully funded PhD/MSc scholarships (2–4 years),
- Joint-supervision scholarships (1–2 years),
- Post-doc scholarships (up to 6 months),
- Executive programs scholarships (Russia, China, Hungary)
- USAID GSP (graduate scholar program) includes scholarships for MSc, Postdoc, and training
- External scholarships (self- funded or funded by external entities in the form of graduate teaching/ research fellowships) for mostly PhDs and some MScs.

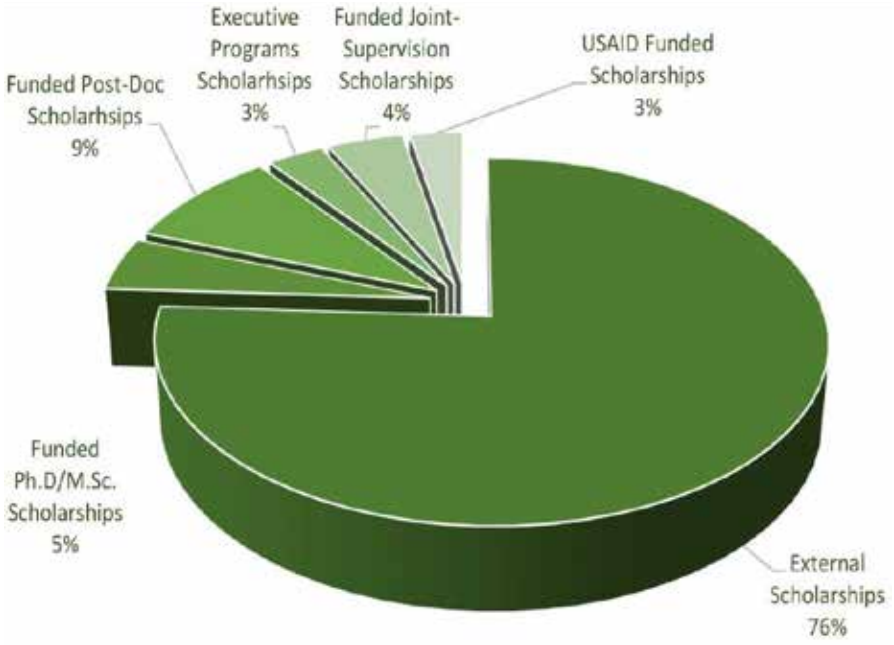


FIGURE (3 - 18) : DISTRIBUTION OF GRANTED SCHOLARSHIP TYPES

A new strategy is needed to design more effective and efficient missions programs that can support national needs and goals. To this end, the CDM plan 2022–2027 has been designed with the one goal in mind: scientific missions must reclaim their role in developing human capacity capable of supporting the growth and ambition of the new Republic of Egypt. To do so, a framework, namely MOTIVE, has been developed to ensure that each new program under the new CDM plan is Measurable in terms of its targets, Optimized in terms of cost and benefit, Tangible in terms of outcomes, Inclusive in terms of its sub-programs and components, supports Value- networks, and Engages with all stakeholders.

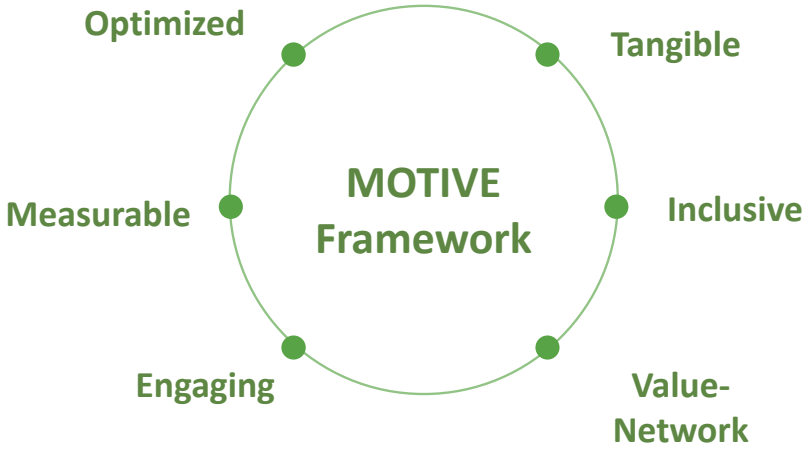


FIGURE (3 - 19) : THE MOTIVE FRAMEWORK TO MEASURE IMPACT

The newly designed dispatching programs are organized around four pillar programs: Future Minds that targets undergraduate students; Future Scientists that targets post-graduate students and post-doctoral fellows; Future Skills; and Future Cadres that targets staff at various ministries, universities, and research centers.

Future Minds	This pillar includes all programs that target undergraduate students, such as: 1-year/1-semester study abroad credit transfer programs, Summer schools, Short-term training courses.
Future Scientists	This pillar includes all programs that target postgraduate and post-doctoral studies, such as: Ph.D./M.Sc. scholarships, Post-doc scholarships, Joint-Supervision.
Future Skills	This pillar includes all programs that target staff at ministries, universities, and research centers to build their technical capability via short and focused training courses that last from 2 weeks to 6 months.
Future Cadre	This pillar includes all programs that target staff at ministries, universities, and research centers to build their administrative and managerial capability via short and focused training courses that last from 2 weeks to 6 months.

FIGURE (3 - 20) : DISPATCHING PROGRAM PILLARS

Under each pillar, a set of programs can be dynamically designed to meet the required needs of various stakeholders. For instance, under the Future Minds pillar, it is possible to design a program that targets undergraduate students to study abroad for one semester/year and transfer their credits to their home university in Egypt. Another program under this pillar could focus on supporting dual-degree programs in universities, by offering students in such programs to study in partner universities for one or more years. Similarly, a program can be designed under the Future Skills pillar to allow for short-term (2 to 24 weeks) training courses to build a particular technical skill in a specific sector such as education or engineering to fulfill a practical need within one or more national stakeholders.

It is worth pointing out that the design concept of the new CDM programs can play a central role in achieving some of the key objectives of the overall MOHESR strategies. For instance, the support for dual-degree programs under the Future Minds pillar can be used to encourage and motivate universities to develop dual-degree programs with reputable universities around the world. That is why it is important to link the objectives of each newly designed CDM program with one or more of the main objectives of the overall MOHESR strategy, which is in turn connected to the overall national objectives and priorities.

In particular, new programs under the Future Skills and Future Cadre pillars can be designed to support the new structure for institutional development at both the ministry level as well as inside the universities. The new international unit in MOHESR and VPs for International collaboration can receive technical and administrative training through tailored CDM short-term training programs to gain more experience in internationalization from successful universities abroad. For international participation, the CDM Future Scientist pillar can play a crucial role in supporting student and staff mobility for conducting research abroad as well as for developing joint research projects and activities. Programs such as joint-supervision and PhD scholarships can pave the road for serious collaboration with top world-wide institutes in key research areas of interest. Programs related to attending strategic and policy making events can also be designed to increase international participation at both universities and MOHESR.

3.3.2.5 Institutional Development for International Collaboration

Two steps will be undertaken to move towards the concept of international cooperation for the development of institutional entities. The first step will consider the administrative structure inside the MOHESR. A unit will be established within the ministry system, which will oversee the follow-up of international cooperation activities implemented within each region in Egypt.

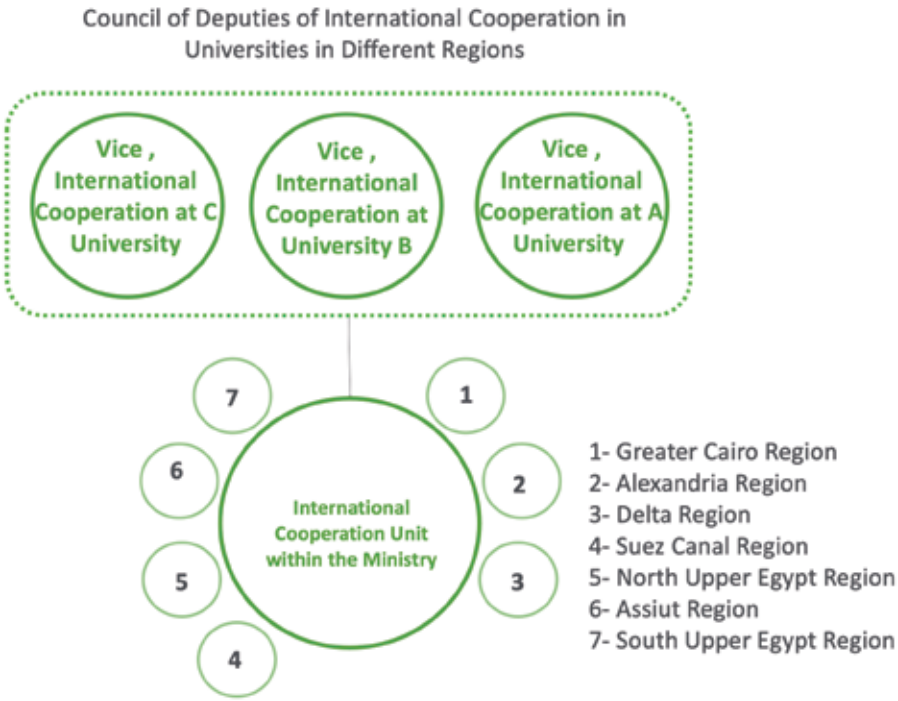


FIGURE (3 - 21) : INSTITUTIONAL DEVELOPMENT ASPECTS

Second, a new position will be introduced in the new administrative structure. This position will be for the vice president for international cooperation, who will be responsible for studying the possibility of developing cooperation and training programs to exchange experiences between students and professors, as well as cooperate with other academic and industrial institutions, which help enrich educational services, scientific research, and innovation in common areas. This VP will also be responsible for studying the establishment of joint programs in the field of technological education, and the needs and requirements of the labor market for graduates of technological universities.

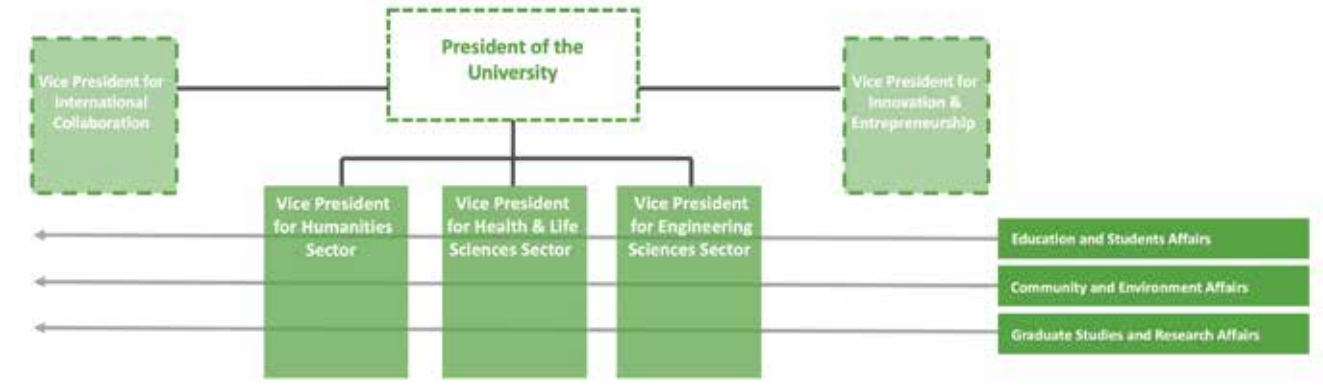


FIGURE (3 - 22) : NEW ADMINISTRATIVE STRUCTURE IN HIGHER EDUCATION INSTITUTIONS

Virtual connectivity is essential for achieving both internal and external connectivity. It enables flexibility in learning and collaboration, expands access to education, and fosters global engagement and cooperation. Digital technologies and platforms play a key role in creating a connected and collaborative virtual environment within higher education institutions. It involves utilizing online learning platforms, virtual classrooms, communication tools, and digital collaboration spaces to facilitate remote learning, virtual

meetings, research collaborations, and knowledge sharing. This type of connectivity is built based on the technology to link all HEIs and bodies as all Egyptian universities are connected a centralized VPN network which is managed by the supreme council of universities. Communication between the institutions is monitored virtually at the level of the seven regions which allows the creation of broader opportunities for communication and cooperation without physical movement between the regions. Communication in the virtual world through the master control system is led by government bodies (Governmental Dashboard) with numerous initiatives being implemented to promote virtual connectivity through various models.

3.3.2.6 Smart University/Campus Concept

The Smart University/Campus concept is a new model for smart universities that leverages technology and innovation to create an advanced learning environment. SURA, Smart University Reference Architecture, is developed with co-operation with ITIDA (affiliated to Ministry of Communications and Information Technology, MCIT). This model describes 34 functions necessary to fulfill the complete vision of a smart university.

The key features and functions of the SURA model include:

- Connectivity and communication: The model emphasizes seamless connectivity and effective communication systems to enable collaboration among students, faculty, and staff. This includes the use of reliable internet connectivity, unified communication platforms, and mobile applications.
- Digital infrastructure: The smart university/campus incorporates a robust digital infrastructure comprising high-speed networks, secure data storage, and advanced computing systems to support various educational and administrative activities.
- Smart learning: The concept promotes the use of innovative technologies and designs in physical learning spaces, such as smart classrooms, interactive whiteboards, virtual reality labs, and other tools that enhance the learning experience.
- E-learning and virtual education: The smart university embraces e-learning platforms and virtual education tools to provide flexible and accessible learning opportunities, including online courses, multimedia resources, and virtual classrooms.
- Smart campus: The model integrates smart technologies for efficient campus management, including smart access control systems, automated building management, energy management systems, and smart parking solutions.
- Digital and examination labs: Smart digital and examination labs in smart universities go beyond the basic functionalities of traditional labs by incorporating advanced technologies and intelligent systems. These labs integrate various cutting-edge technologies and combine digital tools, software applications, and online platforms to create an interactive and efficient environment for both learning and examination purposes.
- Smart support: The smart university focuses on enhancing student services through digital platforms, self-service portals, and mobile applications. This includes services such as registration, course selection, grade tracking, and access to academic resources.
- Smart operation: The SURA model highlights the integration of digital tools and platforms to facilitate research activities, collaborative projects, and knowledge sharing among researchers and institutions.
- Smart assessment: The smart university utilizes data analytics and techniques to gather insights, monitor student performance, improve decision-making processes, and enhance overall operational efficiency.
- Security and privacy: The model emphasizes robust cybersecurity measures and privacy protection protocols to safeguard sensitive data and ensure a secure digital environment.

By adopting the SURA model, universities can transform into smart campuses that offer enhanced educational experiences, improved operational efficiency, and increased connectivity and collaboration. The integration of technology and smart systems allows for personalized learning, seamless administrative processes, and the utilization of data-driven insights to drive innovation and continuous improvement within the institution.

3.3.2.7 Towards a Unified Platform and a Database

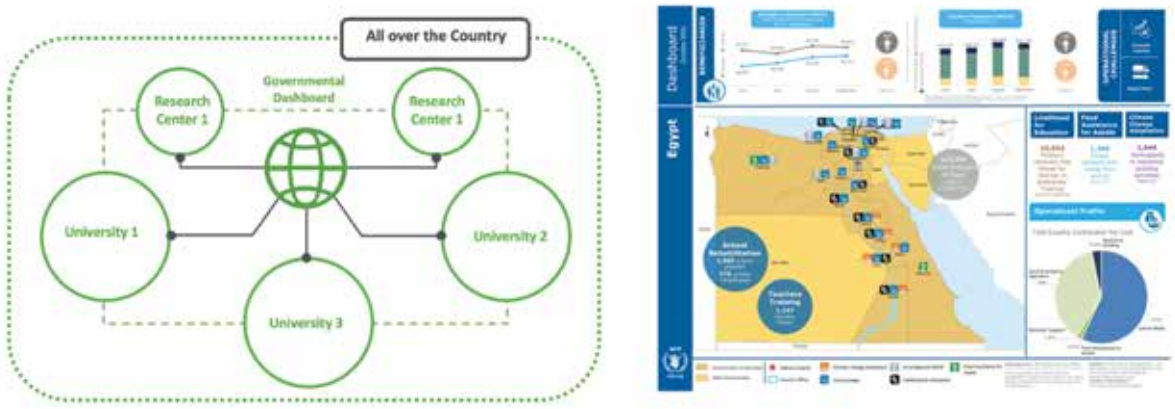


FIGURE (3 - 23) : VIRTUAL CONNECTIVITY OF DIFFERENT HIGHER EDUCATION INSTITUTIONS UNDER GOVERNMENT DASHBOARD

The MOHESR has developed a long-term plan for the implementation of a unified online platform. This platform aims to streamline the process of accessing and applying for funding opportunities from various Egyptian entities.

This platform can ensure the integrity of the submitted work and the exclusivity of its submission to a specific Egyptian agency (and not to other agencies) during the review process. This action might include procedures such as:

- Implementing Collaboration portal to provide connectivity between all university staff and agencies providing funds.
- Platforms to connect professors from both universities and research centers.
- A portal for funding agencies in Egypt to unify the fields of project funding and create ways of collaboration between different funded projects.
- Fixing internet of things (IoT) platforms to be smartly connected with all devices, such as monitors (e.g., stations, energy control, utility meters, parking, researcher allocations, etc.)

3.3.2.8 HE National Dashboard for Career Services Management and Employability Outlook

The Higher Education National Dashboard for Career Services Management and Employability Outlook is an online platform designed to centralize and streamline career services and employability initiatives in the higher education sector. It serves as a comprehensive tool for universities to effectively manage, track, and enhance their career services programs. It promotes collaboration, empowers students and alumni in their career journeys, and contributes to the overall employability of graduates from the higher education sector.

FIGURE (3 - 24) : THE NATIONAL DASHBOARD FOR CAREER SERVICES MANAGEMENT & EMPLOYABILITY OUTLOOK

This dashboard serves as a comprehensive tool for universities and institutions to manage and monitor the various aspects of their career services programs. Here are some key features and functionalities of the HE National Dashboard:

- Centralized data management: The dashboard allows universities to store and manage student and alumni data related to career services and employability. This includes information such as internship and job placements, career counseling records, skills development programs, and alumni outcomes.

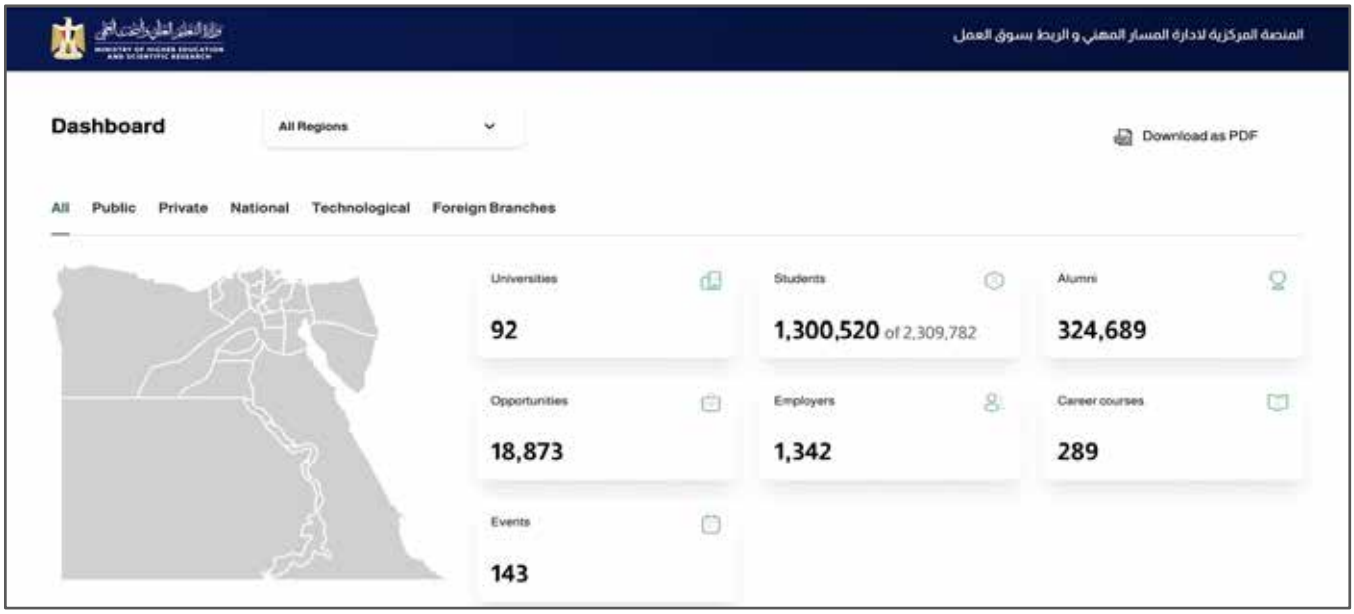


FIGURE (3 - 25) : SAMPLE PAGE ON THE HE NATIONAL DASHBOARD (EXPECTED ANALYSIS)

- Job and internship posting: The dashboard provides a platform for employers to post job and internship opportunities directly to participating universities. Students and alumni can access these listings, increasing their access to employment opportunities relevant to their fields of study.

- Career counseling and guidance: The dashboard enables universities to schedule and manage career counseling sessions, allowing students to seek guidance on career paths, job search strategies, resume writing, interview preparation, and professional development.

- Skills development programs: Universities can offer skills development programs through the dashboard, including workshops, training sessions, and online courses to enhance student employability skills. These programs can cover areas such as communication skills, leadership development, entrepreneurship, and industry-specific skills.

- Alumni tracking and engagement: The dashboard allows universities to track the career progression of their alumni and facilitate alumni engagement. This includes tracking employment outcomes, alumni success stories, and organizing networking events or mentoring programs to connect alumni with current students.

- Reporting and analytics: The dashboard generates reports and analytics to provide universities with insights into the effectiveness of their career services programs. This includes data on job placement rates, alumni satisfaction, employer feedback, and trends in the job market.

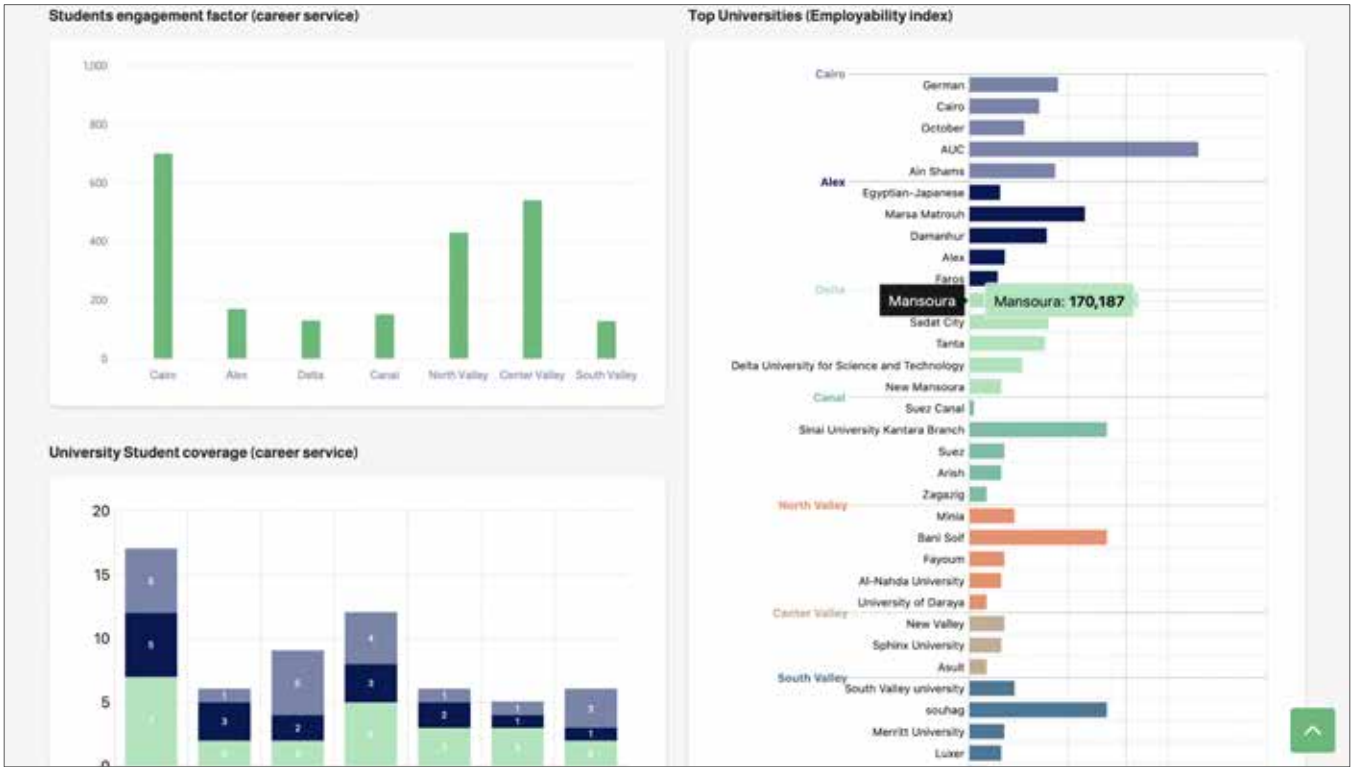


FIGURE (3 - 26) : SAMPLE ANALYTICS ON THE HE NATIONAL DASHBOARD (EXPECTED ANALYSIS)

- Collaboration and networking: The dashboard promotes collaboration and networking among universities by facilitating the sharing of best practices, resources, and success stories. Universities can exchange ideas, collaborate on joint initiatives, and learn from each other's experiences to enhance their career services and employability outcomes.
- Integration with external systems: The dashboard can integrate with external systems such as employer databases, alumni databases, and student information systems to ensure seamless data flow and enhance the functionality of the platform.

3.3.2.9 Virtual Connectivity Dashboards and Tools

Artificial intelligence tools can provide a platform that extracts valuable knowledge and can analyze, classify, organize, filter, search and explore unstructured data in ways that are not possible with a simple keyword search.

These tools enable the analysis of documents and text data at scale, accelerating productivity and using knowledge otherwise locked in document repositories. The MOHESR can use various types of software that can help in:

- Creating libraries: AI tools can extract text fields and paragraphs from documents, enabling the creation of a comprehensive library of digital content.
- Ranking and enriching data: Intelligent agents can be trained to score documents and data based on predefined criteria. This allows for the generation of insightful analyses and helps identify valuable information within large datasets.
- Exporting scores via API or CSV: The AI software allows for the export of scores obtained from the analysis either through an Application Programming Interface (API) or in CSV format, enabling seamless integration with other systems for further analysis.
- Analyzing and publishing: A business intelligence dashboard provided by the AI software can offer pre-defined analysis templates. Alternatively, customization options are available for analysis according to specific requirements.

Also, virtual connectivity tools have become essential in facilitating collaboration, communication, and remote learning within Egyptian universities. Commonly used virtual connectivity tools in the university setting include:

- Video conferencing platforms: Tools such as Zoom, Microsoft Teams, and Google Meet enable real-time video and audio communication. They support online lectures, virtual meetings, group discussions, and interactive sessions.
- Learning Management Systems (LMS): LMS platforms provide a centralized online hub for course materials, assignments, quizzes, and grades. They facilitate communication between students and instructors through discussion forums, announcements, and messaging features.
- Collaboration and project management tools: Tools like Microsoft SharePoint, Google Drive, and Dropbox allow students and faculty members to collaborate on documents, share files, and manage project workflows. They enable real-time editing, version control, and easy access to shared resources.
- Virtual classroom platforms, instant messaging, and chat tools: Communication tools like Microsoft Teams enable real-time messaging and collaboration among students, faculty, and staff. These platforms support group chats, channels for specific topics or courses, and integration with other tools for seamless communication.
- VR/AR systems: Augmented Reality (AR) and Virtual Reality (VR) technologies are increasingly being used in collaboration to enhance learning, research, and communication experiences. For example, AR and VR can be used to train students and professors from the alliance universities in various fields, such as engineering, education, and healthcare. where virtual and augmented experiments can provide realistic experiences without the need of real transfer.

3.4 IMPLICATIONS AND SIGNIFICANCE

Connectivity networks go beyond the capabilities of individual institutions, enabling them to undertake activities that would otherwise be challenging. Connectivity operates at various levels: internally, it establishes connections among higher education institutions and research centers within Egypt, encompassing physical connectivity, market sector engagement, and regional cooperation. Simultaneously, external connectivity focuses on fostering communication and collaboration with international partners. These two tracks are complemented by virtual connectivity, facilitated by digital platforms and tools for communication, collaboration, and data sharing.

Higher education institutions act as catalysts for connectivity and interdisciplinarity, fostering the integration of capacities and experts from diverse fields to collaboratively tackle regional and global challenges. By encouraging a culture of collaboration and exploration, universities empower individuals to become proactive drivers of change, thereby facilitating the advancement of society and the enhancement of people's well-being.

This paves the way for effective participation and highlights the actual achievements of universities in fostering regional innovation. This also includes providing fee-based services through specialized entities such as training centers, consultancy units, science and technology parks, and medical parks. The overarching goal is to align these efforts with the principles of Egypt's Vision 2030 development agenda, facilitating the advancement and realization of its objectives.

Arab Republic of Egypt

وزارة التعليم العالي والبحث العلمي

Ministry of Higher Education
& Scientific Research

4.
EFFECTIVE PARTICIPATION

4.1 INTRODUCTION

Effective participation is the contribution of universities to regional innovation. It involves the collaboration of the regional consortium of HEIs with private companies established by HEIs to offer different paid services such as scientific research, national projects, and development projects. These paid services are the product of the development entities such as training centers, consultancy units, science and technology parks, and medical parks. In addition, the effective participation of university hospitals encompasses a wide range of activities, all aimed at improving healthcare delivery, advancing medical education, driving research and innovation, and contributing to community health and well-being. The whole process aims to reach and fulfill the principles of development of Egypt's Vision 2030.

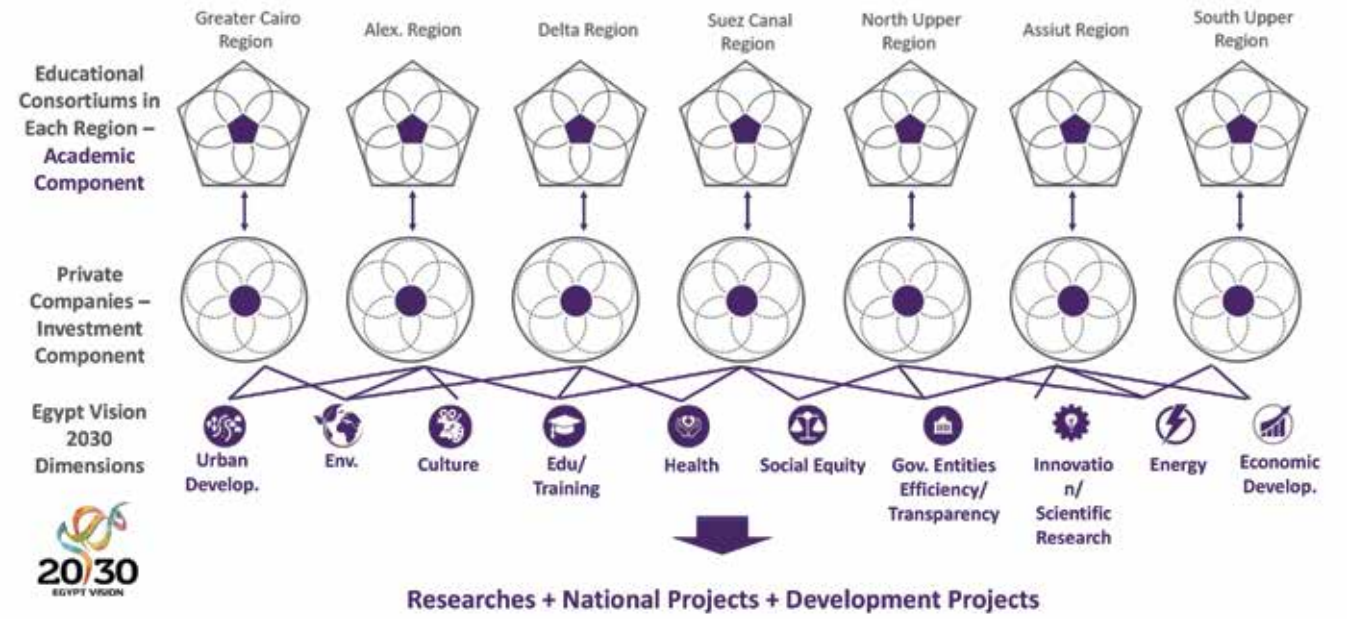


FIGURE (4 - 1) : THE MECHANISM & GOAL OF EFFECTIVE PARTICIPATION

4.2 WHY DOES IT MATTER?

Firstly, universities play a key role in regional development by providing the knowledge base that can underpin innovation. One of the most important ways in which a university can contribute to its region is through the transformation of research into a form that can be taken up by regional actors in the private and public sector. Universities are key drivers of knowledge creation, innovation, and research. They have the expertise, resources, and intellectual capacity to address complex societal challenges. By actively participating in various spheres, such as policymaking, industry collaborations, and community engagement, universities can contribute their unique perspectives and research findings to shape effective solutions.

Secondly, universities serve as hubs of education and skills development. They play a crucial role in preparing students to become experienced with the knowledge, critical thinking abilities, and practical skills needed for the workplace and civic engagement. Effective participation of universities ensures that their educational programs align with the evolving needs of society and the labor market.

Thirdly, universities act as catalysts for regional and national development. Through collaboration with government entities, industry stakeholders, and local communities, universities can utilize their expertise and resources to drive economic growth, promote social cohesion, and address regional disparities. They can contribute to the development of human capital, support entrepreneurship, and foster innovative ecosystems.

On the other hand, university hospitals effectively participate in a broad spectrum of activities, playing a key role in healthcare delivery, education, and research.

They are pivotal in providing high-quality patient care, leading in advanced treatments and healthcare practices. These institutions also significantly contribute to educating future healthcare professionals and are at the forefront of medical research, developing new treatments and technologies. They actively engage in community health initiatives and public health services, influence healthcare policies at various levels, and set clinical care standards. Their work involves interdisciplinary collaboration for comprehensive care and resource optimization, including human and financial resources, to enhance healthcare delivery. Ultimately, their efforts are geared towards improving healthcare services, advancing medical education, fostering research and innovation, and promoting community health and well-being.

Moreover, universities are centers of cultural preservation, artistic expression, and social dialogue. Effective participation allows universities to actively engage in promoting cultural heritage, encouraging diversity and inclusion, and fostering critical conversations on social issues. They can contribute to societal progress by providing spaces for open dialogue, promoting democratic values, and nurturing informed citizens.

Lastly, effective participation of universities enhances accountability and transparency in higher education. Universities that actively engage with stakeholders and wider society are more likely to uphold ethical standards, demonstrate social responsibility, and ensure that their actions align with public interest.

4.3 CHANNELS OF EFFECTIVE PARTICIPATION

Effective participation channels for universities can vary depending on the specific context and goals. There are two main channels:

1. Participation in Community Service and Environmental Development
2. Participation in Building the National Economy

Higher education and scientific research play a critical role in building the national economy and helping society in numerous ways. Firstly, HEIs provide the necessary knowledge and skills to develop a competent workforce. By equipping individuals with specialized education and training, universities contribute to the growth of industries, innovation, and productivity, thereby driving economic development. Secondly, scientific research conducted in universities leads to breakthroughs, advancements, and technological innovations that have a direct impact on various sectors of the economy. This helps solve societal challenges, improves healthcare, enhances sustainability, and promotes industrial competitiveness.

On the other hand, HEIs also serve as platforms for community development, bringing together experts from various fields to work collectively on addressing societal challenges. By nurturing a culture of inquiry, universities empower individuals to become active agents of change, facilitating the transformation of society and the improvement of people's lives.

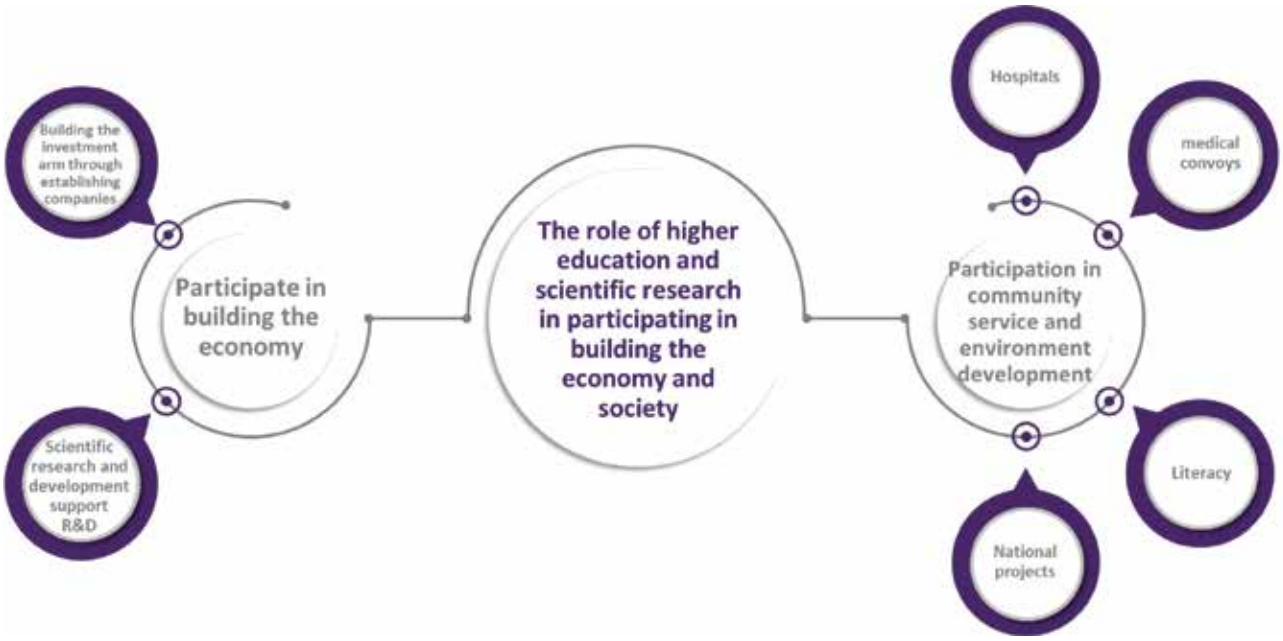


FIGURE (4 - 2) : THE ROLE OF HIGHER EDUCATION AND SCIENTIFIC RESEARCH IN ECONOMIC DEVELOPMENT

4.3.1 Participation in Community Service and Environmental Development

Effective participation involves engaging with local communities and addressing their needs and aspirations. Universities can establish community outreach programs, volunteer initiatives, and partnerships with community organizations to contribute to social development, cultural enrichment, and addressing local challenges. This can involve sharing resources, providing educational opportunities, and supporting community-driven initiatives.

In addition, university hospitals significantly contribute to community service, and environmental development, through diverse initiatives. In community service, they offer health education programs focused on preventive care and nutrition, conduct free or subsidized medical camps for underprivileged communities, and organize volunteer services for health improvement. For environmental development, they implement sustainable healthcare practices, research environmental health impacts, and raise community awareness on related issues.

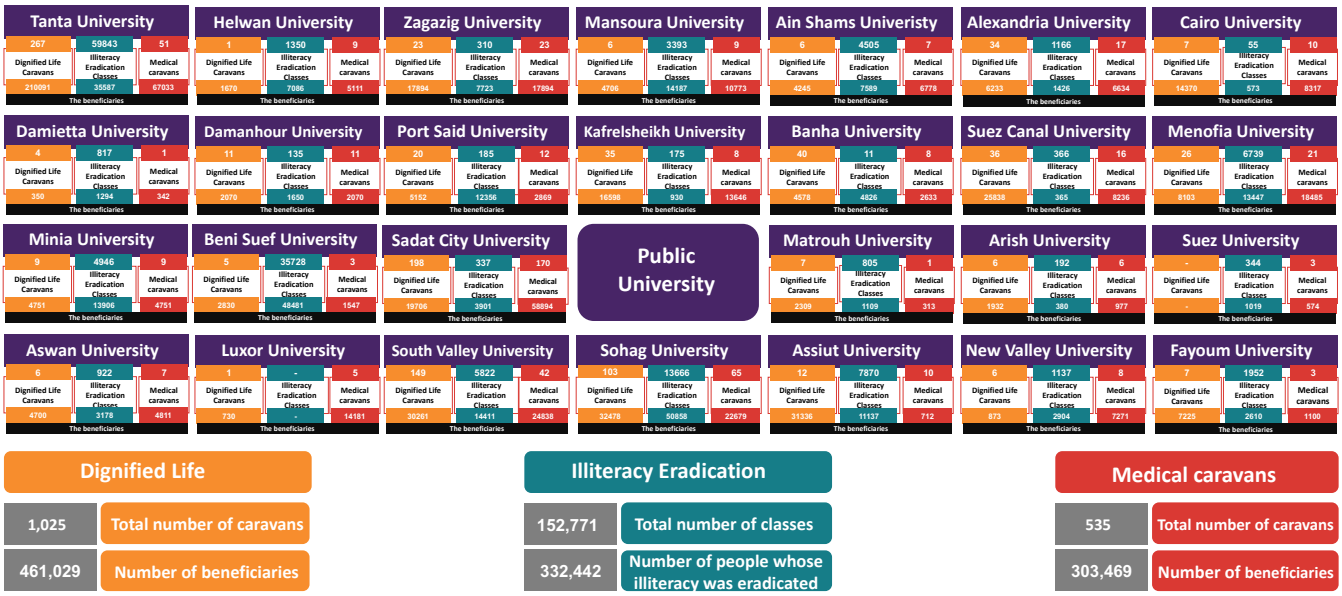


FIGURE (4 - 3) : PUBLIC UNIVERSITY PARTICIPATION IN SOCIAL INITIATIVES

4.3.1.1 University Hospitals

As part of the continuous development of university hospitals, many projects have been accomplished in accordance with a strategic plan to provide high quality and robust availability of healthcare to the Egyptian people. University hospitals have a significant role to play in the strategic development vision of the MOHESR, particularly in the area of effective participation.

Several university hospitals (25 hospitals) have undergone extensive upgrading to compete with highest international quality standards of healthcare services, provided through state of the art facilities and equipment such as the New National Cancer Institute (500/500), Ain Shams University Medical City, Liver Transplant Center - Mansoura University, Kasr al-Aini Development Project, Sohag University Hospital for Trauma, Tanta Specialized Surgical University Hospital, Tanta Oncology Center for Children, Borg al-Arab Oncology Hospital for Children in Alexandria, and the upgraded National Oncology Institute. in Cairo.

FIGURE (4 - 4) : UNIVERSITY HOSPITALS

4.3.1.2 Medical Convoys

Medical convoys are an excellent example of university participation in community service. These convoys typically involve a group of medical professionals, including faculty members, students, and volunteers, who travel to underserved areas or marginalized communities to provide healthcare services and support. Universities organize and participate in medical convoys as part of their commitment to social responsibility and community engagement. These convoys serve to address healthcare disparities and improve access to medical care in areas that lack adequate healthcare facilities or resources.

University teams set up temporary clinics or medical camps where they offer a range of services such as general check-ups, screenings, vaccinations, dental care, and health education. They also provide medications, medical supplies, and referrals for further treatment if necessary. Medical convoys contribute to building trust and goodwill between universities and the communities they serve. By actively engaging with residents, universities establish long-term relationships and demonstrate their commitment to the well-being of the community. This can pave the way for future collaborations and partnerships in various areas, such as research, capacity building, and community development.

Moreover, there are international medical missions to Africa, such as those to Sudan, South Sudan, Djibouti, and Tanzania. They represent a significant contribution to enhancing the healthcare of the African populace. These efforts effectively participate in elevating health standards and providing essential medical services in these regions.

4.3.1.3 Literacy

Promoting literacy is a significant example of effective university participation in community service. Recognizing the importance of education and literacy for personal development and societal progress, universities often initiate programs and initiatives to enhance literacy rates and support educational opportunities in their communities. They establish literacy centers or learning hubs that offer tutoring, mentoring, and educational resources for individuals of all ages who need assistance with reading, writing, and numeracy skills. These centers may be staffed by university faculty members, students, and volunteers who provide personalized support and guidance.

In addition, universities collaborate with local schools, libraries, and community organizations to develop literacy programs and initiatives. They also organize workshops, training sessions, and literacy campaigns to raise awareness about the importance of literacy and provide tools and techniques for improving reading and writing abilities.

Through their participation in literacy initiatives, universities contribute to empowering individuals, reducing educational inequalities, and fostering lifelong learning in the community. By promoting literacy, they enable individuals to acquire essential skills for personal growth, access better employment opportunities, and actively participate in the social, cultural, and economic development of society. Moreover, university involvement in literacy programs has a transformative impact on their own students. By engaging in community service and witnessing the positive change they bring, students develop a sense of social responsibility, empathy, and a deeper understanding of the challenges faced by marginalized individuals and communities.

FIGURE (4 - 5) : EXAMPLES OF EFFECTIVE UNIVERSITY PARTICIPATION

4.3.1.4 National Projects

Participation of HEIs in national projects is a significant example of the involvement of these institutions in community service. National projects are initiatives or programs undertaken by the government or other national entities to address critical challenges and promote development in various sectors. HEIs can play a crucial role in these projects by providing their expertise, resources, and research capabilities.

Three important national projects were established by the ministry of higher education and scientific research and discussed previously in current status section:

1- New National Universities and National Universities Emanating from Public Universities

The establishment of new national universities is aimed to contribute to the development of the educational system in Egypt, offering modern programs of study that keep pace with the demands of the local, regional and international labor market. It is based on the latest learning systems adopted in major international universities.

2- New Technological Universities

Technological universities are targeted to qualify graduates to be able to meet the requirements of the labor market and support the plan of the MOHESR to develop technical and technological education. Thus, changing the perception of society towards this important educational path. In addition, cooperation protocols are signed to train students practically and hone their expertise and abilities to serve as a powerful addition to the labor market.

3- Branches of Foreign Universities 2023

This initiative contributes to providing international education within Egypt, fostering greater diversity, and elevating competitiveness. As a result, the country is prepared to become a regional and international hub for higher education, scientific research, technology, and training services.

Furthermore, HEIs can support national projects by offering training and capacity-building programs. They can provide specialized education and skills development opportunities to individuals involved in the project, ensuring that they have the necessary knowledge and expertise to contribute effectively. This can include workshops, seminars, and vocational training programs tailored to the specific requirements of the project. Moreover, HEIs participation in national projects creates opportunities for student engagement and experiential learning. Students can contribute to the project through internships, research projects, or community service activities, gaining practical skills and

real-world experience while making a meaningful impact on the community.

HEIs can also collaborate with government agencies and policymakers to provide evidence-based recommendations and contribute to the formulation of policies that drive the success of the project. Universities may offer advisory services, policy briefs, and expert consultations to inform decision-making and ensure the project's alignment with long-term national goals. Research and development are one method of HEIs contribution to national projects. They engage in scientific research, innovation, and technological advancements to address the specific needs and objectives of the project. Universities can collaborate with government agencies, industry partners, and other stakeholders to conduct research, develop solutions, and offer expert advice in areas such as infrastructure development, renewable energy, healthcare, agriculture, or urban planning.

A prominent example is the role of **Specialized Scientific Councils (SSCs) at the Academy of Scientific Research and Technology (ASRT)** in the national projects. ASRT acts as a think tank that draws the roadmap of solutions to challenges facing the country. SSCs are a national house of expertise and a center of knowledge and are the entity charged with guiding future policies in different scientific disciplines at the national level in light of regional and global changes. They serve as a vehicle for strategic thought and constitute the beating heart of knowledge transfer thanks to a distinguished group of Egyptian scientists and experts representing universities, centers, institutes, scientific and research bodies, experts, and industrialists. They provide their expertise and research to decision makers in the form of strategic and future studies, technological road maps, reports and independent data on controversial topics related to science, technology, and innovation.

The academy has 20 SSCs, each specializing in a different field of science and technology including social and human sciences and composed of 15 of the best scientists selected using accurate and transparent international standards. The percentage of outstanding young researchers is between 20% and 30% of the membership of each quality council with the total membership of quality councils about 300 scientists and experts who are all colleagues and fellows of the ASRT. SSC fields of specialization include health, agriculture, food, medicine, environment, water, energy, culture, sociology, economy, technology, transportation, communications, industry, oil, mineral resources, remote sensing, future studies, risk management, education policy, and scientific research.

4.3.2 Participation in Building the National Economy

Universities can actively participate in collaborative projects and partnerships with industries. By engaging with businesses, universities can share expertise, conduct joint research, and develop innovative solutions that address industry challenges and foster economic development. These collaborations can also lead to internships, work-integrated learning opportunities, and industry advisory boards, enhancing the relevance and quality of education. It should be noted that the ministry of higher education focused on developing mechanisms for implementing investment projects with the private sector with the aim of building the national economy.

4.3.2.1 Building University Investment Arms

In reference to Law 23 of 2018 and the incentives stipulated for science, technology and innovation, HEIs can establish different forms that foster innovation: starting from technology and business incubators, science and technology parks to start-ups that can provide economic support through technological products, solutions and services. This integrates the active role of universities in creating ideas and knowledge with the labor market, through a model that allows the university to lead and set priorities. Through these companies, it is possible to initiate investments with values that support sustainable development, encourage innovation, and minimize consumption. This investment component is also characterized by being economically productive and based mainly on innovation and entrepreneurial concepts, which often come from young people. It supports new ideas and is in line with the concept of the role of universities as fourth generation HEIs. Each region will be able to create a regional consortium with an economic support component that enables universities to actively participate in the economic mechanisms at the regional level in all aspects of development.

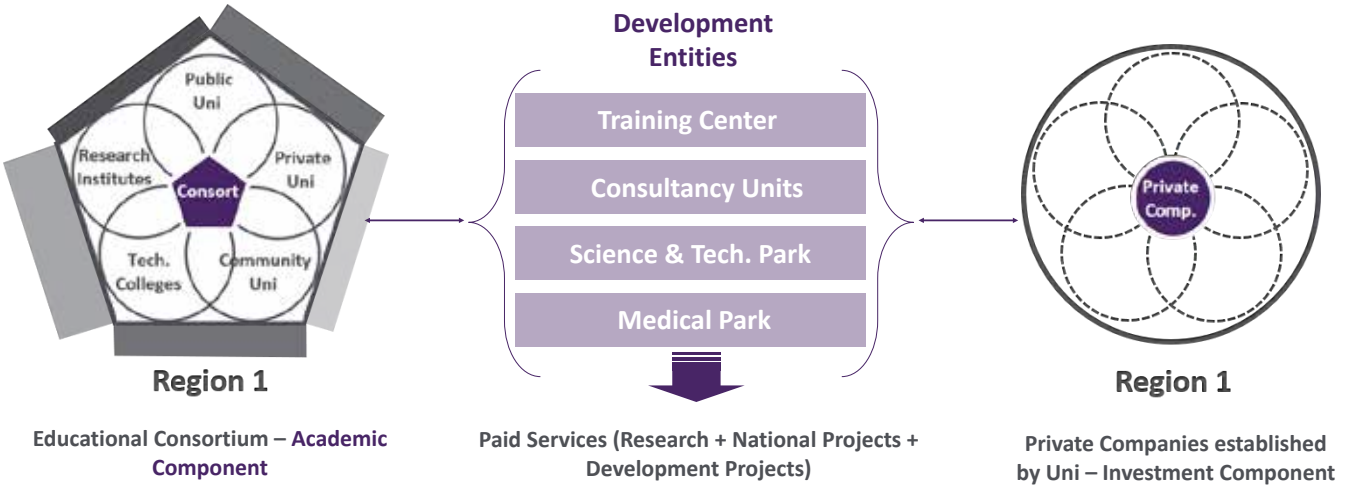


FIGURE (4 - 6) : UNIVERSITY PRIVATE SECTOR INVESTMENT MODEL

This model is shaped by two main actors. The first actor is the education consortium, focusing on education, and may be involved in several collaborative activities including research, curriculum development, innovative initiatives, shared resource opportunities, and information dissemination. This in turn leads to the development of concrete proposals for research; pooling of resources (human and otherwise) across national boundaries; improvement in research skills; delineation of coordinated data gathering procedures; and dissemination of findings, interpretations, conclusions, and implications of research.

The second actor is the private companies established by HEIs and research institutes. Companies set up by universities, commonly referred to as university start-ups, form the investment backbone of the institution. These companies are often established to commercialize intellectual property, innovations, and research outcomes generated within the university's academic and research departments. University startups empower the expertise and knowledge of faculty, researchers, and students to develop innovative products, technologies, and services that have market potential. These companies play a vital role in driving economic growth, job creation, and technological advancements. They attract investment, create partnerships with industry stakeholders, and contribute to the overall development of the regional and national economy. By bridging the gap between academia and industry, university startups demonstrate the practical applications of research and foster a culture of entrepreneurship and innovation within the university ecosystem. The investment backbone provided by these companies enables universities to transform their intellectual capital into tangible economic and societal impacts.

FIGURE (4 - 7) : AN EXAMPLE OF UNIVERSITY COLLABORATION WITH THE PRIVATE SECTOR THROUGH INVESTMENT ARMS

4.3.2.2 Consultancy Services

Universities can provide consultancy services to businesses, offering their expertise and research capabilities to address specific industry needs. This collaboration enhances the knowledge and skills of the workforce, promotes innovation, and contributes to the growth of businesses. This represents a direct and effective method of promoting collaboration between businesses and universities. Typically, universities have designated offices or centers for business engagement, where companies can seek specialized assistance in addressing pressing challenges. These projects are typically time-limited, governed by contractual agreements, and involve well-defined goals, milestones, and associated costs.

This mechanism enables businesses to access the vast knowledge resources of the university and helps to embed university expertise within the private sector, thus demonstrating the tangible impact of their research. Businesses that engage with universities are more likely to be innovative and growth- oriented and therefore have the potential to make a greater contribution to their local and regional economy.

Many businesses find it difficult to identify access points to universities. Universities need to not only pro-actively promote their services to local businesses but also ensure that there are clear contact and entry points. There is often a clash of cultures between the academic and private sectors, with businesses motivated by immediate solutions and returns in the short term, while university staff may be more motivated by longer term research outputs. Clear terms of reference must be established to ensure that expectations are shared and realistic. Providing consultancy services is predicated on the assumption that businesses already know exactly what it is they need to overcome their problems and/or grow.

4.3.2.3 Knowledge Transfer Partnerships (KTPs)

This mechanism involves encouraging the mobility of human capital between the university and local businesses. Postgraduate (often post-doctoral) staff from the university work on relatively long-term research projects (usually 1-3 years) within a local company and are overseen by commercial and academic supervisors. As well as the obvious benefits of diffusing research into commercial arenas, KTPs are also important tools in developing 'boundary-spanning' skills among the people involved in the project which leads to improved relationships between the university and local companies and creates greater opportunities for future collaborations. Because of the reliance on human capital and 'soft skills' in the success of KTPs it is seen as a relatively complex but potentially transformational activity for the beneficiaries. The regional development KTPs are a tool primarily employed in the UK, where they have attracted significant national government investment. KTPs enable businesses with a strategic need to access a university's expertise and knowledge to improve their competitiveness, productivity, and performance. The scheme involves a high-caliber graduate (KTP Associate) working in a company with academic supervision. This often results in strategic advantages for the company, academic benefits to the university, and valuable industrial experience for the associate. Depending on the needs of the organization and the desired outcomes, KTPs can vary in length from one to three years.

KTPs are an important tool in disseminating research from universities into local businesses and communities, and as such, they are an important mechanism for realizing regional economic development. These ensure that maximum 'value' from the investment in research is embedded in the region. Researchers who are not subject to the day-to-day commercial pressures of running the business can be highly skilled in helping to identify and overcome endemic problems. Also, universities may be working with several businesses in the same industry, and hence can diffuse learning between them.

FIGURE (4 - 8) : COLLABORATION BETWEEN KTPS AND INDUSTRY

4.3.2.4 Science, Technology and Business Parks (STBPs)

Science, technology and business parks require significant capital investment, but they have the effective potential to effect transformational impact. STBPs are generally established to house new and existing businesses in a 'hub', often with strong links to research centers and universities. This hub refers to a centralized location or ecosystem that promotes development, collaboration, and innovation in the fields of science and technology. It serves as a physical or virtual space where researchers, scientists, entrepreneurs, and businesses come together to exchange ideas, conduct research, develop technologies, and drive advancements in various scientific and technological domains. It typically offers a range of resources and support services to facilitate the growth and success of individuals and organizations within the ecosystem. These can include state-of-the-art laboratories, research facilities, access to funding opportunities, mentorship programs, networking events, and business incubation and acceleration services.

They are aimed at supporting the exploitation of research that has already proven to have commercial applications. In contrast, Research and Technology Centers (see below) generally support technologies at a much earlier stage in development or technological 'readiness'. They provide a focus for the downstream investment in new technologies emerging from the research base in universities to bring them closer to market commercialization and bridge the gap between research and its application. These hubs create an environment that encourages interdisciplinary collaboration, knowledge sharing, and the commercialization of research outcomes. By bringing together researchers, industry professionals, and other stakeholders, science and technology hubs promote the transfer of knowledge and technology from academia to industry, leading to economic growth, job creation, and societal impact.

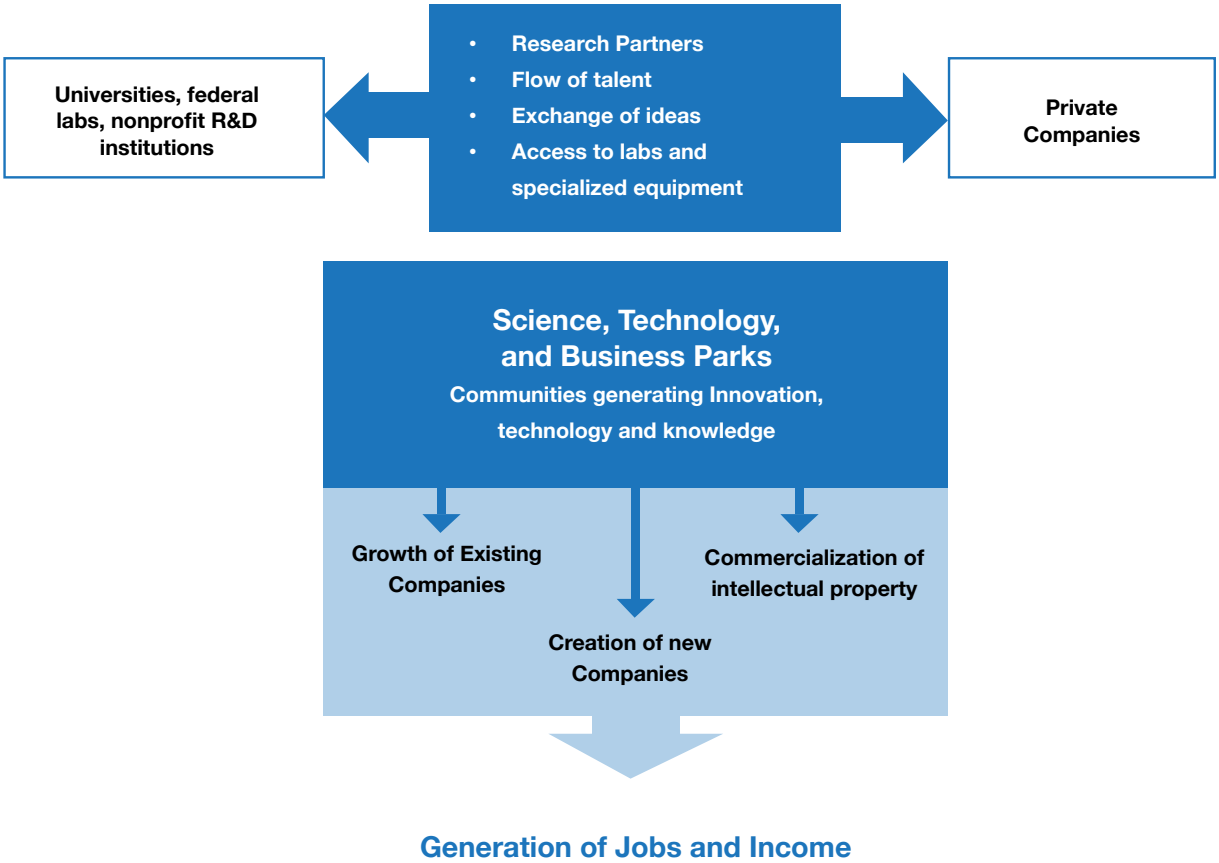


FIGURE (4 - 9) : RESEARCH PARK CONCEPT.[2]

2 Tsarchopoulos, P. (2007). Characteristics and Trends in Research Parks. Technology Parks. Retrieved from https://www.urenio.org/2007/10/31/characteristics-and-trends-in-research-parks/

4.3.2.5 Research and Technology Centers

The regional development of Research and Technology Centers creates a critical mass for business and research innovation by focusing on a specific technology where there is a potentially large global market and significant national capability. They provide a 'translational infrastructure' to provide business-focused capacity and capability that bridges research and technology commercialization. They are generally focused on the exploitation of new technologies, through both established technology areas and in new, emerging technologies. Models across Europe include Technology Innovation Centers (TICs) in the UK, the Fraunhofer Gesellschaft in Germany, and TNO in the Netherlands.

These centers are an important part of the innovation system, with potential to make a major long-term contribution to economic growth. They allow businesses to access equipment and expertise that would otherwise be out of reach, as well as conducting their own in-house R&D. They also help businesses access new funding streams and point them towards the potential of emerging technologies.

Through their research activities, HEIs generate new knowledge, technologies, and innovations that have the potential to drive economic growth. By collaborating with industry partners, HEIs can address industry challenges, develop new products, and enhance the competitiveness of businesses. Moreover, they facilitate the transfer of technology and research outcomes to the industry through technology licensing and startup companies, fostering innovation and creating new business opportunities. They contribute to job creation, innovation, and economic diversification. Overall, scientific research and development serve as key drivers of economic prosperity, technological advancement, and sustainable development for the national economy.

A prominent example is the Technology Innovation Commercialization Office (TICO) at the Egyptian Academy of Scientific Research and Technology (ASRT). It typically functions as a bridge between research and the marketplace. It is designed to facilitate the process by which innovative ideas and technologies developed in universities and research institutions can be transferred to the market, leading to the development of new products, services, and companies, TICOs aim to activate the role of scientific research, link it with industry, and support trust between them, introduce funding and international cooperation opportunities, and spread the culture of intellectual property and patents. The Academy has established more than 56 offices to support innovation, transfer and market technology in universities, centers and research institutes. The offices are divided into a technology transfer office, offices to follow up on research projects and introduce financing and international cooperation opportunities, and offices to support innovation and technology through intellectual property and patents. The Academy provides financial support for two years to establish and activate the functions of the offices and support training for office members at home and abroad, in addition to providing opportunities for communication between the various offices, industry and society.

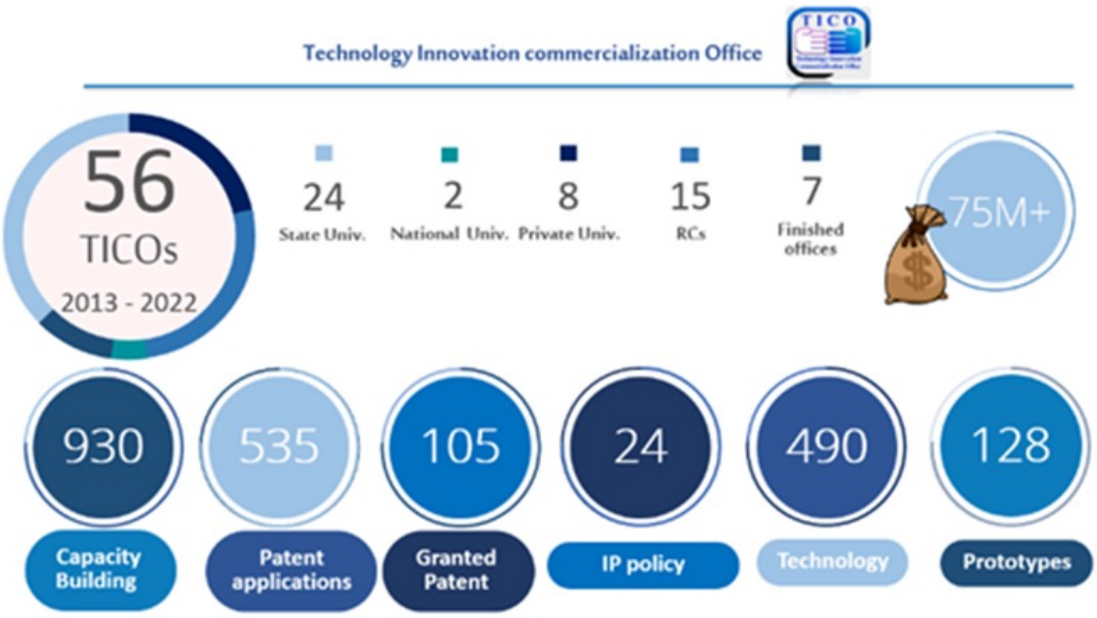


FIGURE (4 - 10) : THE TECHNOLOGY INNOVATION COMMERCIALIZATION OFFICE (TICO) AFFILIATED WITH ASRT

To succeed, these centers need to be integrated within a national innovation system and strategy which pays appropriate attention to business requirements and the location of relevant expertise. Additionally, HEIs should encourage entrepreneurship and support startups, providing incubation programs, mentoring, and access to funding opportunities.

4.4 EFFECTIVE PARTICIPATION ROADMAP

Developing a roadmap for the effective participation of universities in the national economy and community engagement involves several key steps and considerations:

- Engage relevant stakeholders, including government agencies, industry partners, and community organizations. This involves understanding their needs, aspirations, and priorities to align university initiatives with community and national interests and implement effective communication strategies to raise awareness about the university's contributions to the national economy and community. It also requires the utilization of various channels, such as websites, social media, public events, and media relations, to share success stories, promote partnerships, and engage with stakeholders.
- Establish collaborations and partnerships with industry, government, and community organizations to maximize the use of resources, expertise, and networks, promoting mutually beneficial relationships that enhance economic development, knowledge exchange, and community well-being.
- Integrate real-world challenges and industry needs into university curriculums.
- Align research activities with national priorities, focusing on areas that have direct relevance to the economy and the community by encouraging interdisciplinary research and collaboration among faculty and students.
- Provide an entrepreneurial environment within the university with support for start-ups, business incubation, and technology transfer. This includes offering mentorship programs, funding opportunities, and resources to enable faculty, staff, and students to translate their research and ideas into commercial projects. For example: the ISF, an Egyptian Fund applying international specifications, supports technological advancements that enable innovators, entrepreneurs, and gifted students to develop world-class technological and scientific solutions to meet market and societal challenges and become a catalyst for a scientific-based economy.
- Establish centers of excellence to serve as a bridge between industry needs and scientific research and development. It is a specialized entity that brings together industry partners, academic experts, and researchers to address specific challenges and drive innovation in a particular field or industry. The primary objective of a center of excellence is to establish strong collaborations and partnerships between academia and industry, ensuring that research efforts are closely aligned with the practical needs of the market. By actively engaging industry stakeholders in the research and development process, the center can identify relevant problems, explore potential solutions, and facilitate the transfer of knowledge and technology.

In conclusion, it is important to discuss strategies for the sustainability of the roadmap for effective university participation in the national economy and community engagement. Comprehensive and ongoing efforts are required to manage resources and adapt to changing circumstances for creating a lasting impact on society.

Arab Republic of Egypt

وزارة التعليم العالي والبحث العلمي

Ministry of Higher Education
& Scientific Research

5.
SUSTAINABILITY

5.1 INTRODUCTION

Sustainability principles must be at the heart of the strategy of HEIs in order to realize change in education. Conversely, education also acts as a driving force for establishing sustainability. It is one of the main means of communications and the basis for the "sustainability mindset." By emphasizing management ethics, entrepreneurship, environmental studies, systems thinking and self-awareness, the sustainability mindset encourages us to break away from traditional management disciplinary silos.

Basically, sustainability in higher education refers to the strategic utilization of available resources, optimizing efficiency and promoting the long-term viability of the institution. It involves responsibly managing resources while ensuring the effective operation of the institution. It aims at fostering interdisciplinary collaboration, entrepreneurship and innovation and embedding sustainable practices throughout the institution's system of teaching, research, and development.

Facing current challenges such as **population increase, resource depletion, and the increase in needs,** requires a holistic sustainable approach for integrated solutions. There is a need to create new jobs that meet market needs while aligning with the principles of **fostering growth, increasing development, and enhancing employment opportunities**. Also, the growing number of students and youth of university education age require facilities that accommodate this increase in **enrollment rates**. Finding a sustainable mechanism to create a "**green economy**" which allows for the development of resources while maximizing the benefit of their use is necessary. Furthermore, finding renewable and clean energy alternatives for "**green transition**" enhances the principle of sustainability. Accordingly, sustainability principle integrates three equal dimensions: environmental, social, and economic dimensions to promote a sustainable learning ecosystem.

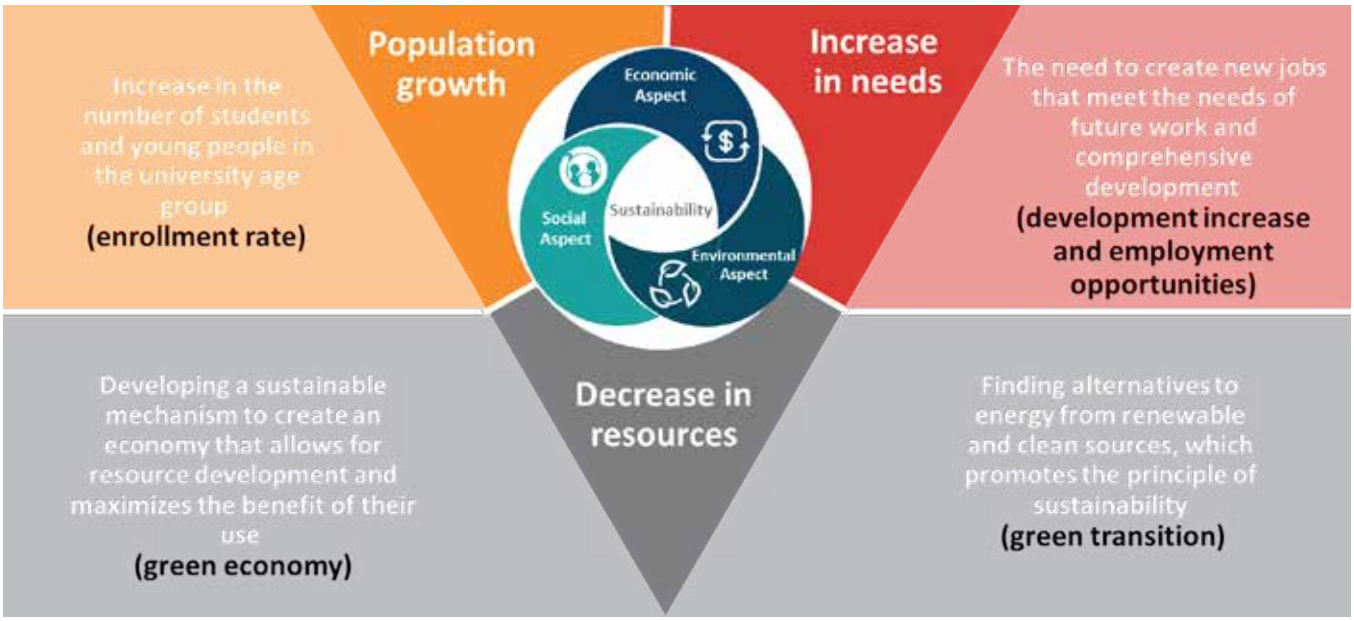


FIGURE (5 - 1) : SUSTAINABILITY PRINCIPLES

5.2 SUSTAINABILITY DIMENSIONS

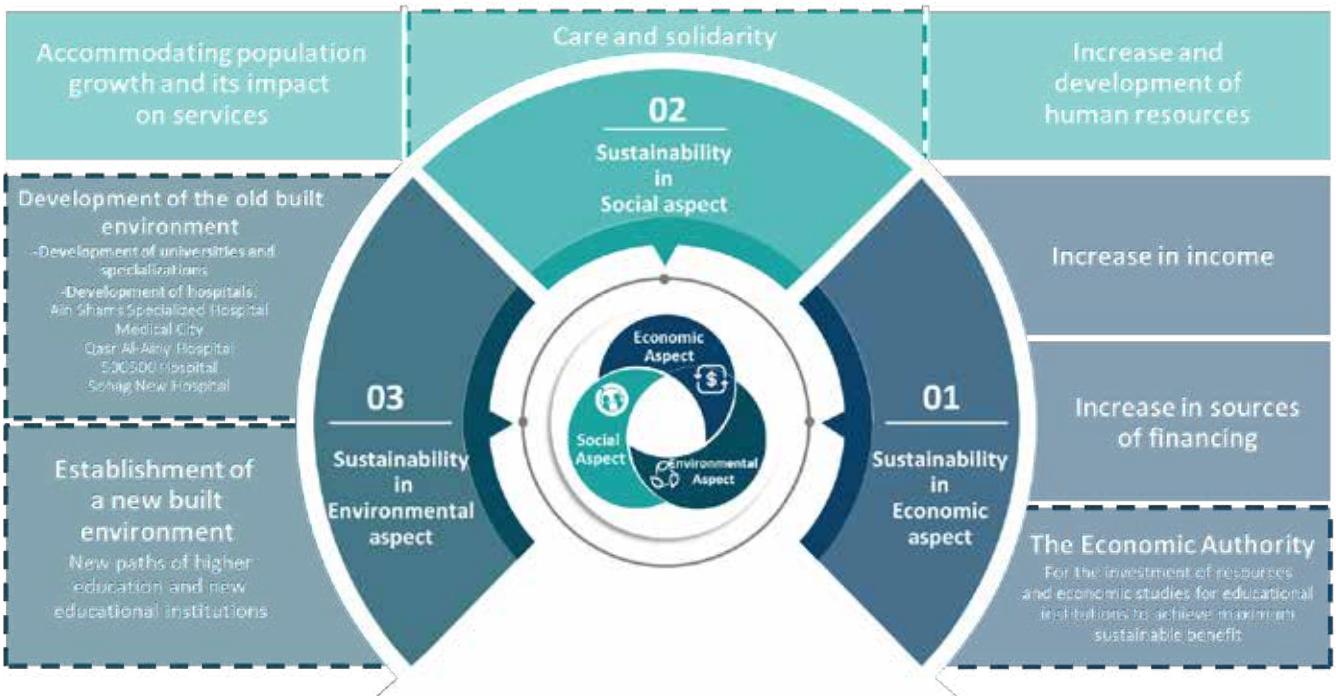


FIGURE (5 - 2) : THE THREE DIMENSIONS OF SUSTAINABILITY

5.2.1 The Economic Dimension

HEIs must consider the need for economic sustainability and responsible resource management by increasing income and developing funding sources. The concepts of integration, communication and effective participation can lead to income augmentation for institutions and individuals. One example is the interdisciplinary programs that can be established in national universities, companies, science and technology valleys, and their direct economic returns on individuals. Also, opportunities can be offered via alliances with the labor market and the offering of paid services. Sustainability then focuses on ensuring the increase of funding sources for institutions and individuals with the attendant increase in income. In addition, this principle ensures that maximum benefit is derived in a more sustainable manner by undertaking economic studies of educational institutions and providing them with the economic authority to invest resources.

Developing funding sources and increasing income is a focal point. Egypt is notably recognized among the easiest countries in the Middle East and North Africa in which to establish a business. It is ranked second globally for the highest rates of investment returns. Moreover, UK stands out as the largest investor in Egypt with more than 30 billion Sterling.

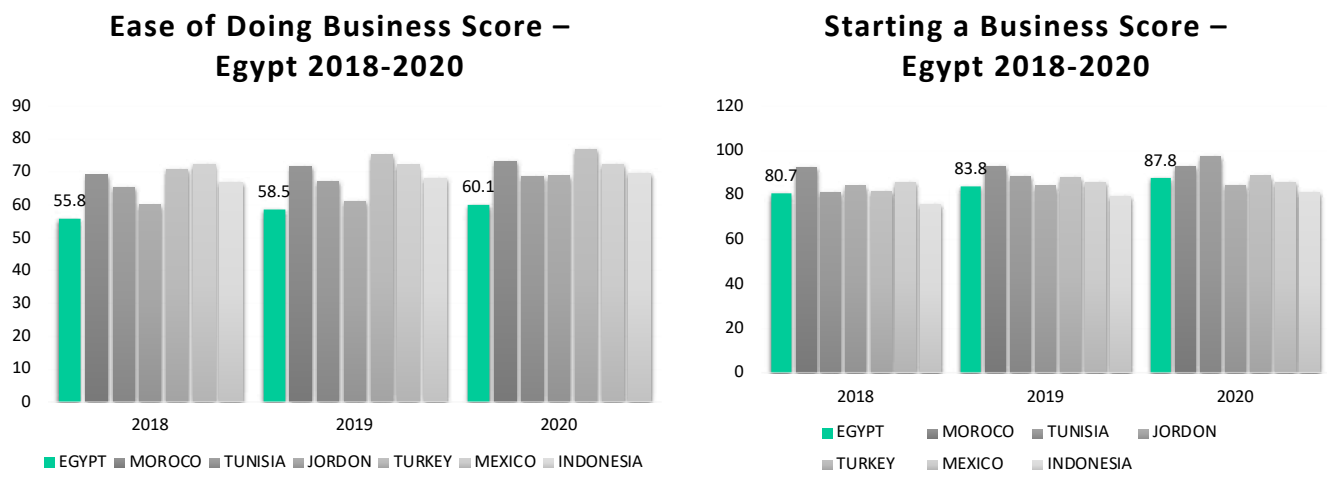


FIGURE (5 - 3) : EGYPT SCORE FOR EASE OF DOING BUSINESS AND SCORE FOR STARTING A BUSINESS

Furthermore, there is potential in assisting investors with administrative procedures for starting business in Egypt and selected regions. Egypt was one of the few emerging market countries that experienced a positive growth rate in 2020 as a result of the government's swift and prudent policy response.

A community approach is needed for the implementation of projects to identify and promote sustainable and economic development. This requires the participation of a variety of organizations and/or the establishment of alliances at the local level. The activities in the university-community nexus fall within two main areas:

1. Educational collaborative models for environmental and sustainability education.
2. The implementation of projects to identify and promote sustainable and economic development in a community.

Universities committed to community engagement might establish reciprocal partnerships that could improve the creativity and responsiveness of both. The key constituencies and strategic themes of the partnership will be reflected in a community engagement strategy.

5.2.1.1 Investment In Higher Education

Investment in higher education is a crucial aspect to promote sustainable and economic development. Basically, the vision of the Ministry of Higher Education and Scientific Research (MOHESR) emphasizes identifying strategies in conformance with development plans and educational investment requirements and resources. Accordingly, decisions are made to balance the educational investment requirements and investment resources for an education that fits with the ministry vision.

Investment opportunities in higher education include:

1- Educational Institutions

- Public/ Governmental Universities.
- National Universities.
- Technological Universities.
- Private Universities.
- International Foreign Universities (IBCs).

2- Student Services

- Student Housing.
- Food Services.
- Banking Services.

3- Hospitals

- Public/ Governmental Universities.
- National Universities.

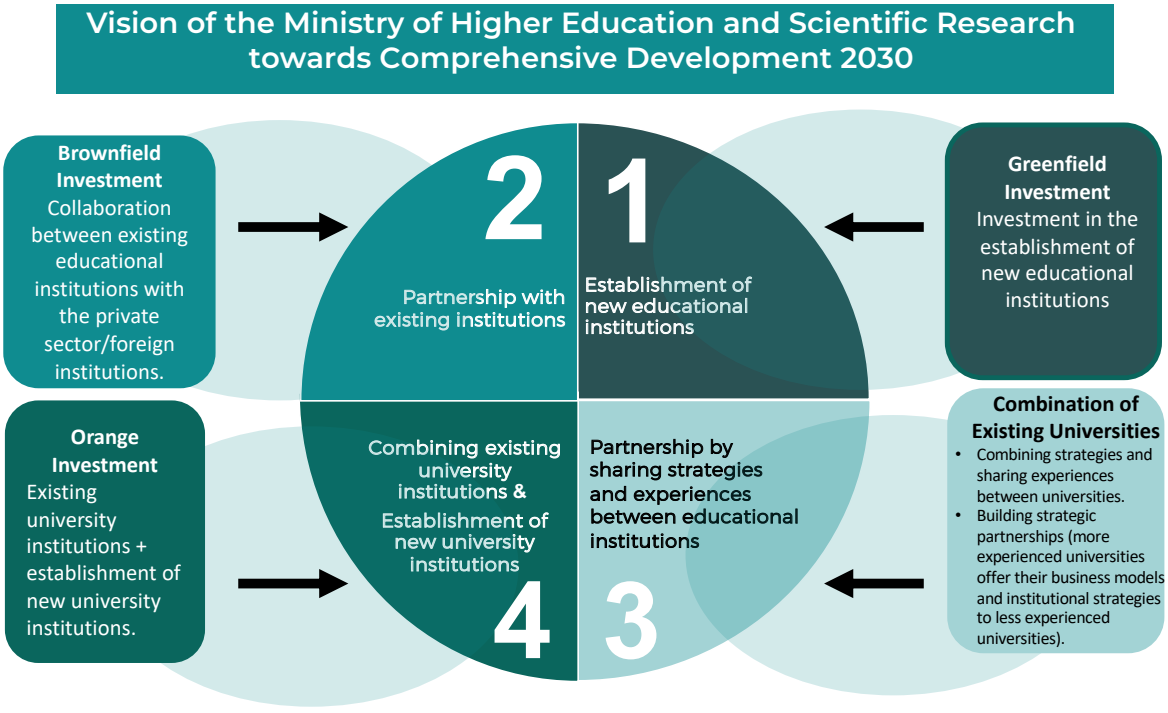


FIGURE (5 - 4) : VISION OF THE MOHESR TOWARDS COMPREHENSIVE DEVELOPMENT 2030

In today's world, universities are becoming more and more diverse and constantly changing in response to environmental uncertainty and increasing international competition. The vision of the MOHESR targets different types of investments as well as their combinations while promoting sharing strategies between HEIs. **Generally, there are two main investment alternatives for higher education:**

- **Green-Field Investment:** Investment in the establishment of new educational institutions (PPP). This is done by investing in vacant lands assigned as educational land use in both existing and new cities.
- **Brown-Field Investment:** Collaboration or partnership between existing educational institutions and the private sector.

The strategy for investing in educational institutions

- Recently, the MOHESR has been promoting the involvement of public educational institutions and private/ foreign educational institutions in collaborative projects to improve quality standards and increase research advantages. Similarly, **public-private partnership (PPP)** is considered a major tool to achieve the ministry's vision of establishing new educational institutions in cooperation with the private sector and foreign educational institutions.
- Public-Private Partnerships (PPPs) in higher education in Egypt have shown potential for positive impact and have been supported by government initiatives. Here are some relevant benefits and outcomes of PPPs in the Egyptian higher education sector:
  - **Expansion of Access:** Private universities and institutions have played a crucial role in expanding access to higher education in Egypt. They have provided additional opportunities for students, particularly in areas with limited capacity in public universities. This has helped accommodate the growing demand for higher education in the country.
  - **Diversification of Programs:** Private universities in Egypt have contributed to the diversification of educational offerings. They often specialize in specific disciplines or niche fields, providing students with a wider range of program options beyond what is available in public universities. This diversification allows students to pursue their interests and choose programs that align with their career aspirations.
  - **International Collaborations:** Private universities in Egypt have actively sought partnerships and collaborations with renowned international institutions. These collaborations bring global expertise, faculty exchanges, joint research initiatives, and exposure to international perspectives. Such partnerships contribute to the internationalization of higher education in Egypt and enhance the reputation and quality of education provided by private institutions.

Great effort has been made to establish new educational institutions in Egypt in recent years and encourage partnerships with the private sector. To this end, the "**Universities Support and Development Authority (USDA)**" was established in 2023.

USDA is:

- An economic entity that aims to support and create opportunities for higher education and enhance its quality by expanding the establishment of private or technological universities, branches of foreign universities, and private higher institutes. Its goal is to advance Egypt's global ranking and achieve the sustainable development goals in alignment with Egypt's Vision 2030.
- This entity utilizes all available means and capabilities, such as providing financing and entering into contracts and agreements to finance private and technological universities, private higher institutes, and branches of foreign universities. It also provides expertise and consultations to elevate scientific capabilities in accordance with international quality standards.

Objectives of USDA:

- Coordinate with relevant bodies to establish new educational institutions in partnership with the private sector/foreign institutions.
- Support government universities in establishing private or private technological universities or expanding existing ones through partnership. The authority is responsible for owning and allocating land to the Ministry of Higher Education and Scientific Research in Egypt.
- Enhance international higher education opportunities within the country and expand the hosting of foreign university branches. The authority contributes to financing the establishment or expansion of university

institutions. It offers consultancy services by experts inside and outside the authority in the field of higher education through contracts with interested parties.

- Support private universities by providing financial and economic consultations to ensure achieving each university's feasibility study goals. It works to raise barriers and improve the efficiency of staff in private and technological universities.
- Maximize resources to establish and develop private and technological universities, private higher institutes, or foreign university branches. It provides necessary funding packages to develop academic programs and enhance the capabilities of faculty members.

Public-Private Partnership (PPP) as a model of collaboration between the government and the private sector:

- **Fully Privatized:** Privately owned, operated, and funded.
- Design - Build - Financing - Maintenance: The private sector designs, builds, manages, and provides services and obtains a profit in return and the government gets a percentage of the profits.
- **Construction - operation - transfer of ownership:** The investor builds the educational institution and manages/operates it for a period, after which the facility is transferred to the government. The investor has the authority to use, but not own, that entity.
- **Operation – maintenance:** The investor provides the services and operation of the educational institution without transferring the ownership of the educational institution to the investor. The right of ownership remains with the government.
- **Lease contracts:** The investor leases the educational institution for a period for a certain fee and bears the operating risk. Ownership remains with the government.
- **Usufruct:** It differs from leasing in that the investment is injected by the investor only.
- **Service contracts:** The educational institution hires certain services from the private sector for a period for a fee.
- **Management contracts:** The educational institution pays the costs of managing its assets to the investor. Operational risks are borne by the educational institution; The investments are made by the educational institution.
- **Traditional partnership**

The next figure illustrates the PPP model showing government collaboration represented by the economic authority and the private/ foreign investor on one educational project. This collaboration offers several possible partnership models with the following main components: land, building, teaching curricula and programs, management, and operating systems, and accreditation to provide an excellent educational service. This collaboration facilitates the possibility of establishing educational institutions through encouraging the public and the private sectors to build partnerships to increase higher education quality and to compete with international universities.

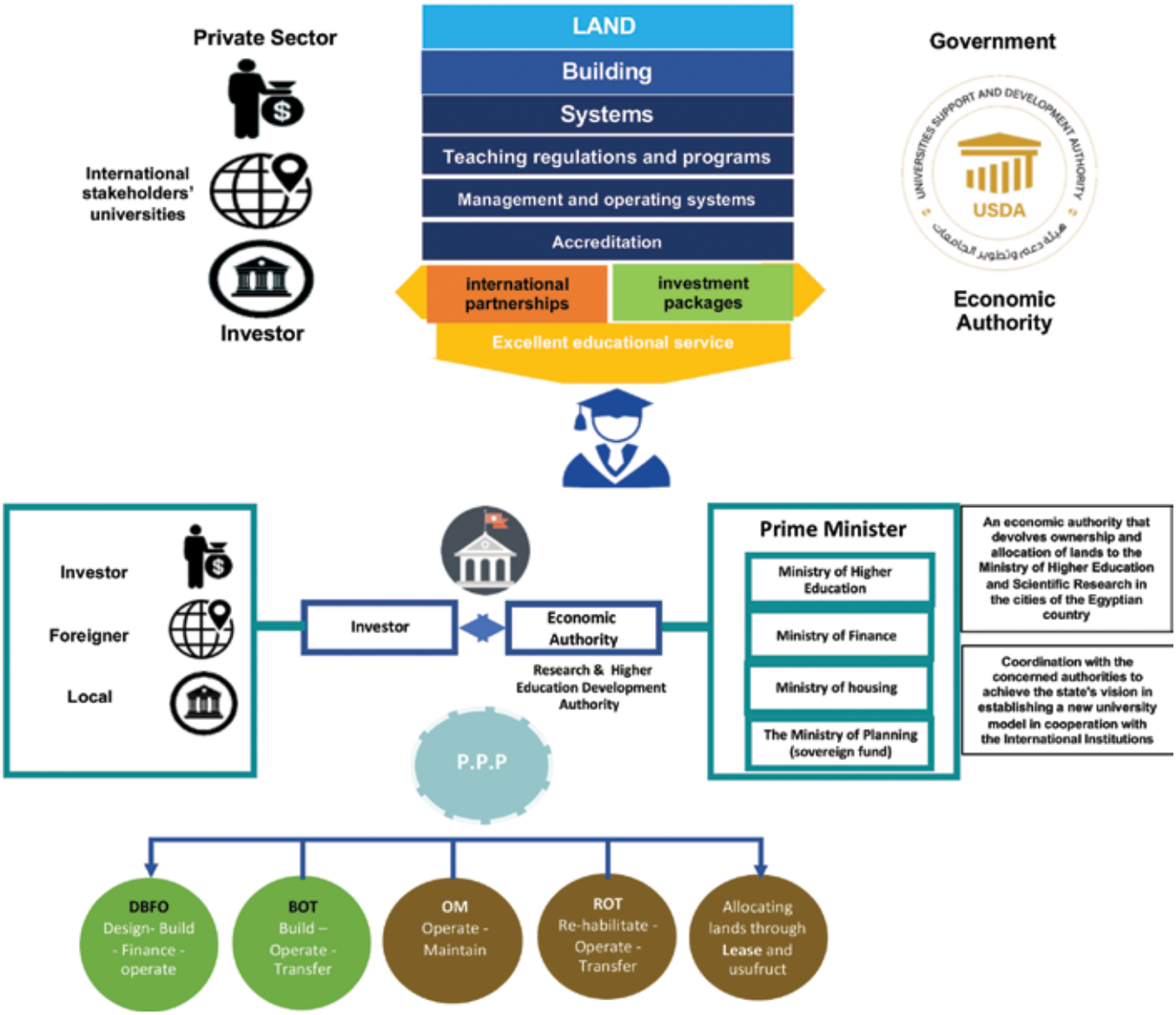


FIGURE (5 - 5) : PUBLIC-PRIVATE PARTNERSHIP (PPP) MODEL SHOWING ECONOMIC AUTHORITY

Recently, the Council of Ministers approved a license for the Universities Support and Development Authority (USDA), which is affiliated MOHESR, in partnership with the Egypt Sovereign Fund for Investment and Development, to establish the "Egypt Fund for Education Support and Development Company," as a platform aimed at encouraging investment in education with the participation of the private sector as well as strengthening partnerships with foreign entities.

FIGURE (5 - 6) : COUNCIL OF MINISTERS DURING THE APPROVAL OF THE ESTABLISHMENT OF "EGYPT FUND FOR EDUCATION SUPPORT AND DEVELOPMENT" COMPANY

5.2.1.2 Economic Return on Higher Education Investment

Higher education is considered one of the main drivers of growth performance and prosperity in national and global economies. In other words, universities and other educational institutions not only deliver education and ongoing skills training, but also impact society, the workforce, and graduates. A key role of higher education institutions is to promote innovation for the purpose of finding solutions to global challenges that impact society, such as population trends, healthcare, and environmental protection. Higher education also has a direct impact on the strength of economies. For instance,

- **Canadian universitie**s generate CDN 55 billion for the country's economy.[1]
- **In the United States**, technological advancements developed in universities and colleges have contributed USD 591 billion to the country's national GDP between 1996 and 2015 alone.[2] Moreover, during the 2020–21 academic year, there were an estimated 914,000 international students enrolled in US universities, making up 4.6% of college students (Open Doors, 2023). International students in US universities have contributed USD 28.4 billion to the US economy through tuition paid to educational institutions as well as through their spending on housing, transportation, and consumer goods while living in the country.[3]
- **Similarly, Australian universities** contributed AUD 41 billion to the Australian economy in 2018. In addition, Australian universities supported 259,100 full-time equivalent jobs. Every AUD 1 invested in the university teaching and scholarships was offset by an AUD 3 increase in additional tax revenue. Every AUD 1 invested in R&D in higher education was offset by an AUD 5 increase in GDP. Moreover, for every additional 50,000 graduates, an additional AUD 1.8 billion of economic activity is generated annually (a 0.09% increase in GDP).[4]

1 Canadian Universities (2017), https://univcan.ca/media-room/publications/national-intellectual-property-strategy-canada-submission/
2 AGB. (2023). from https://agb.org/guardians-campaign/higher-education-contributes-to-a-strong-economy/
3 NAFSA. (2023). https://www.nafsa.org/sites/default/files/media/document/isev_EconValue2020_2021.pdf
4 Universities, C. o. O. (2023). https://cou.ca/

- **In the United Kingdom**, universities are some of the most highly regarded universities in the world and regularly ranked in the top 10. Over 130 universities in the UK provide education to around two million students. By educating people and producing world-leading research, these universities promote human capital and increase the productive capacity of the economy, enabling it to grow. In addition to these longer-term impacts, universities generate economic activity through their employment of staff and their impact on other sectors. For instance, the higher education sector in the UK supports more than 815,000 jobs either directly or across their localities. Also, there is an excess of GBP 95 billion of gross output in the economy in 2018–19. In terms of GDP, the sector grew by around a quarter between 2014-15 and 2018-19 to over GBP 52 billion on account of the international students and visitors attracted by UK universities.[5]

There are several impacts of higher education on country economies including increasing the total GDP, raising taxation revenue, and providing impactful research and job opportunities.

FIGURE (5 - 7) : THE ECONOMIC CONTRIBUTION OF HIGHER EDUCATION

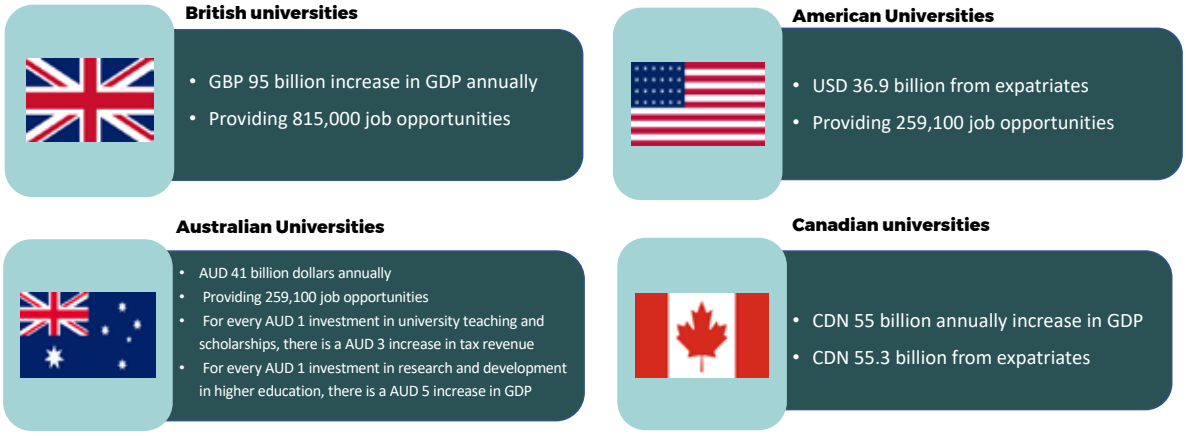


FIGURE (5 - 8) : SUCCESSFUL CASE STUDIES FOR THE IMPACT OF HIGHER EDUCATION AND SCIENTIFIC RESEARCH ON THE ECONOMY AND OVERALL DEVELOPMENT

5.2.2 The Environmental Dimension

This dimension is concerned with developing the built and virtual environments of institutions in addition to the natural environment. It involves a continuous process of improvement within an institution with the goal of maintaining or improving the services provided and includes constructing new buildings or retrofitting existing ones with facilities that can cope with future needs. In addition, it requires updating the traditional inefficient systems to enhance teaching, learning or administrative processes by integrating digital systems and technologies that facilitate the process. This encompasses using digital platforms for online education, e-learning resources, and electronic administrative systems.

5 Economics, Frontiers (2023). https://www.universitiesuk.ac.uk/sites/default/files/field/downloads/2021-09/2021-economic-footprint-sector-summary.pdf

Economic development also helps fulfill the environmental dimension through upgrading facilities infrastructure and integrating digital automated systems. Conversely, the physical environment and systems improvement positively affects financial resources. Consequently, the dimensions are not independent, nor do they exist in isolation, but rather, they are interdependent and exert reciprocal influences.

5.2.2.1 Development of the Built Environment

New buildings or renovations for existing facilities are needed to adapt to the region's evolving needs in terms of student enrollment projections, program requirements, technological advancements, and the SDGs.

Studies have been undertaken to identify areas of deficit and the need to localize more public, national, and private universities across all regions. It included an assessment of current conditions in 2023 of university students and their enrolment rates and distribution across the universities. The study also estimated future deficits by 2032 and 2052 by estimating the number of students at the age of higher education and the corresponding increase in enrolment rates to identify the needed number and type of higher education institutions across Egypt.

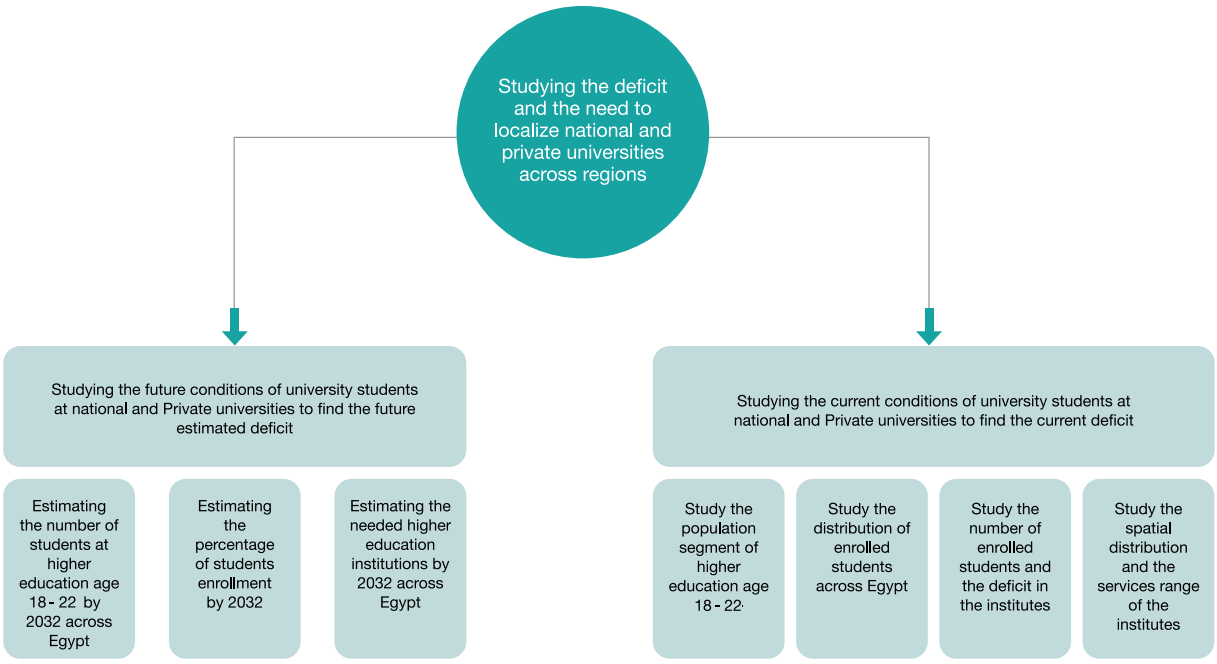


FIGURE (5 - 9) : STUDIES TO IDENTIFY NEEDED UNIVERSITIES.

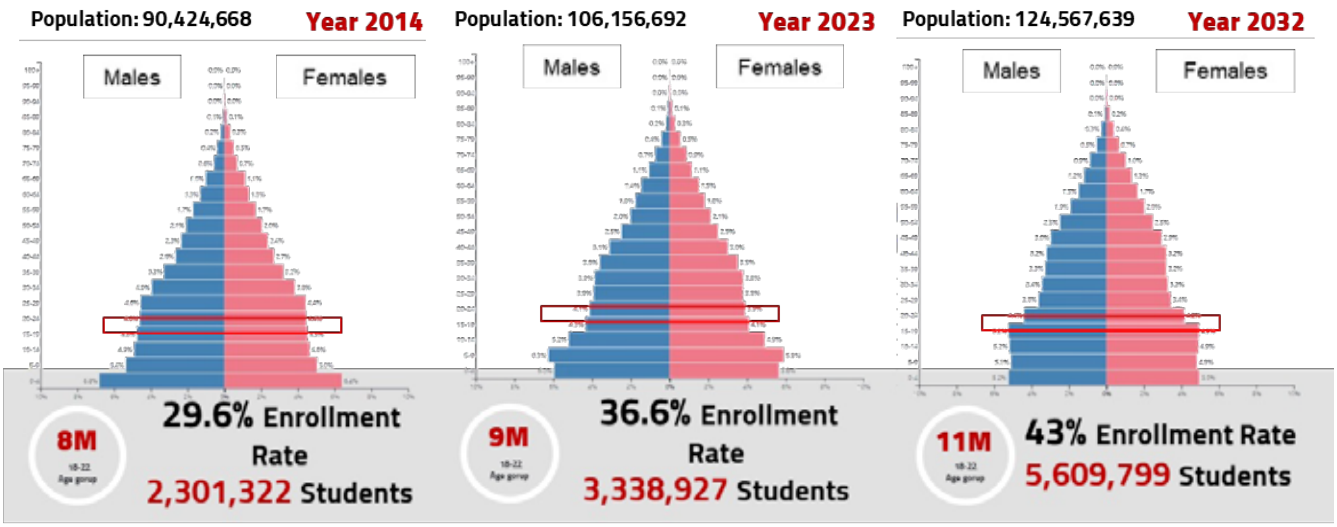


FIGURE (5 - 10) : ENROLMENT RATES FOR MALES AND FEMALES FROM 2014 TO 2032

Based on enrolment studies and the projected increase in student numbers, a comprehensive analysis has been conducted to determine the required number of national and private universities in each region of Egypt by the year 2052. The findings indicate that 12 new national universities are needed in the regions of Greater Cairo, Delta, South Upper Egypt, North Upper Egypt, and Assiut. Additionally, to bridge the estimated future gap, an additional 21 private universities must be established, strategically distributed across the regions of Alexandria, Suez Canal, Delta, South Upper Egypt, North Upper Egypt, and Assiut. The establishment of these 33 new universities is crucial to narrowing the disparity between the expected number of enrolling students by 2052 and the current availability of diverse higher education institutions.

The institution's vision for the built environment is a reference to identifying key priorities, allocating resources, and establishing a timeline for implementation. Involving stakeholders in the strategic plan, including faculty, staff, students, and administrators, helps meet their needs and perspectives. Factors like sustainability, accessibility, flexibility, and the integration of technology are to be considered. Integrating technological solutions into the built environment is a key factor to enhance teaching, learning, and administrative processes. For example, solutions include Wi-Fi, smart classrooms, multimedia systems, learning management systems, and digital resources. Furthermore, the goal is to develop a culture of continuous improvement by evaluating the effectiveness of the built environment, monitoring user satisfaction, and identifying areas for enhancement.

5.2.2.2 Sustainable Digital Transformation

The MOHESR has developed a sustainable plan including a set of models and initiatives as follows:

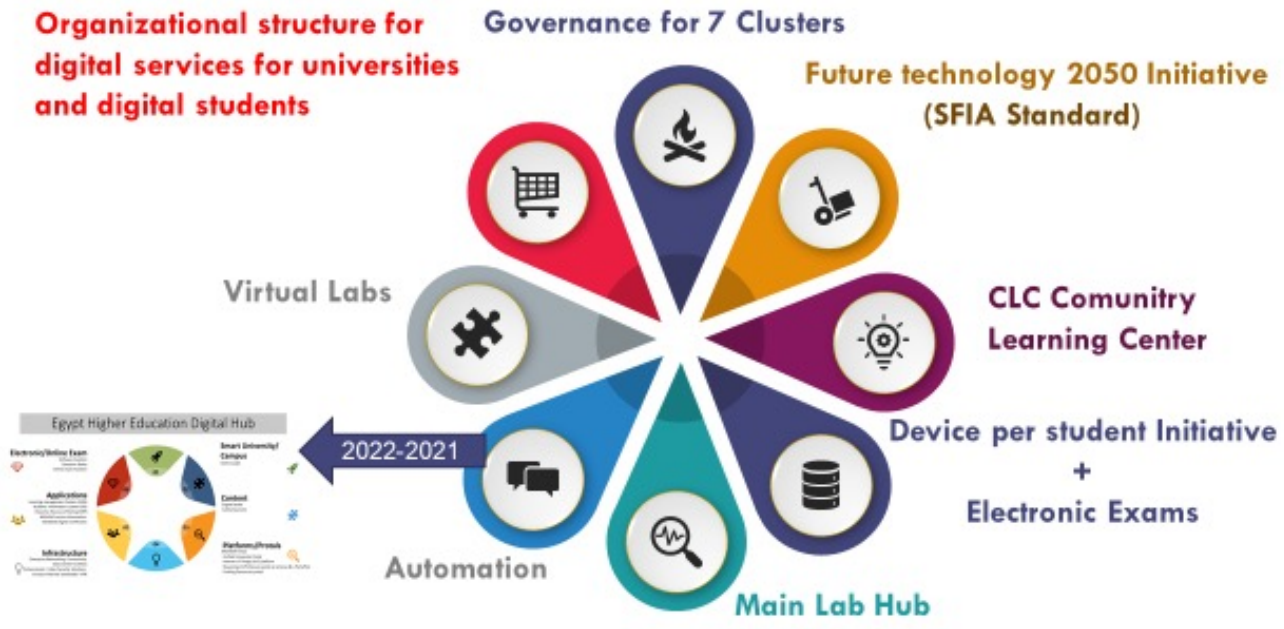


FIGURE (5 - 11) : MODELS AND INITIATIVES FOR THE MOHESR'S SUSTAINABLE FUTURE PLAN

Future Technology 2050 Initiative

The MOHESR has developed an initiative for futuristic skills that aims to enhance the skills of graduates in practice and prepare an internationally competitive student for the national, regional and international labor markets. These skills will be compatible with current and future jobs and include accredited certificates from international technology providers. The idea is to augment the future jobs digital skills into the student's curriculum. Some of these skills are:

Future Job Examples according to the World Economic Forum in 2023:

- AI and Machine Learning Specialists
- Sustainability Specialists
- Business Intelligence Analysts
- Information Security Analysts
- FinTech Engineers
- Data Analysts and Scientists
- Robotics Engineers
- Big Data Specialists

- Agricultural Equipment Operators
- Digital Transformation Specialists
- Blockchain Developers
- E-commerce Specialists
- Digital Marketing and Strategy Specialists
- Data Engineers
- Commercial and Industrial Designers
- Business Development Professionals
- Process Automation Specialists
- Software and Applications Developers

Skills Framework for the Information Age (SFIA)
SFIA is a model for describing the skills and competencies required by professionals in roles involved in information and communication technologies (ICT), software engineering, and digital transformation. SFIA defines the skills and competencies required by professionals who design, develop, implement, manage, and protect the data and technology that power the digital world. ICT programs will be described by skills levels such as those defined by the International Labour Organization (ILO). Graduate transcripts will state skills levels gained by each student in each course.

Community Learning Center (CLC)
This center aims to serve the community and maximize the return on investments made on university assets and resources such as laboratories, E-Exam Labs, libraries, theaters, conferences halls informatics infrastructure, network, and internet coverage. This will help create interaction at all community levels and increase the level of service by universities to local society through programs such as “Haya Karema.”

Device-Per-Student Initiative and Electronic Exams
This is an initiative to provide a portable device for each student to help in the learning journey and facilitate electronic exams. It is a new vision to provide tools to access educational resources by subsidizing a device (e.g., laptop, mobile, tablet, etc.) for each student instead of supporting university labs to procure huge number of devices only available on-site with access for students limited to allocated labs. In addition, internet access, network connectivity and different applications provided by each faculty will be supported. This initiative will try to target all student categories with a target of 100% digitally enabled students within 6 years.

Main Lab Hub
This involves upgrading all faculty ICT labs to be multipurpose with an optimum scheduling scheme to maximize lab usability and increase the value-for-money spent on lab assets.

Smart & Green Automation
This initiative includes the use of smart tools presented in IoT systems to improve resource utilization and save consumption of water, electricity, etc., by using systems such as motion sensors to control lighting. It also involves increased use of green energy such as solar and wind power.

Virtual Labs
Virtual labs aim to provide remote access to simulation-based labs in various science and engineering disciplines. These labs will encourage students to conduct experiments by arousing their curiosity and help them in learning basic and advanced concepts through remote experimentation. This also will save the consumption of raw material in chemistry and physics labs and will enhance the educational process by enabling students to repeat the experiments many times, an option not available in physical labs because of lab access limitation. This involves providing a complete Learning Management System (LMS) where the students/teachers can benefit from the various tools for learning, including additional web resources, video lectures, animated demonstrations, and self-evaluation tools.

Organizational Structure for Digital Services
The organizational structure for digital services represents how the university organizes its digital services through units such as the digital library, portals, mentoring and evaluation units, quality units, etc. Organizational structures defined within systems (business, reporting, etc.) should support the complete environment for digital universities.

TechOlympics
This is a set of ICT based competitions between university students aimed to promote digital skills among students. Through these national competitions students will learn and practice new technologies in collaboration with the international ICT companies. Also, by providing interaction between academia and industry, students will have internship and training opportunities in ICT companies.

5.2.2.3 Educational Hospitals (Electronic Health)
Electronic Health is a branch of the environmental sustainability approach of the MOHESR. At the Supreme Council of University Hospitals, there is conviction that moving towards a proactive or preventive care approach requires data-driven, clinically meaningful

insights available to physicians to enable them to make prognostic, predictive decisions early on, which will have significant impact on the healthcare sector. The state of healthcare by 2030 will be very different from the picture today thanks to Egypt's Vision 2030. The focus will be on ensuring better outcomes for patients at lower costs and with improved patient experience and innovations in care delivery. In addition, novel business models will also create growth opportunities along the way.

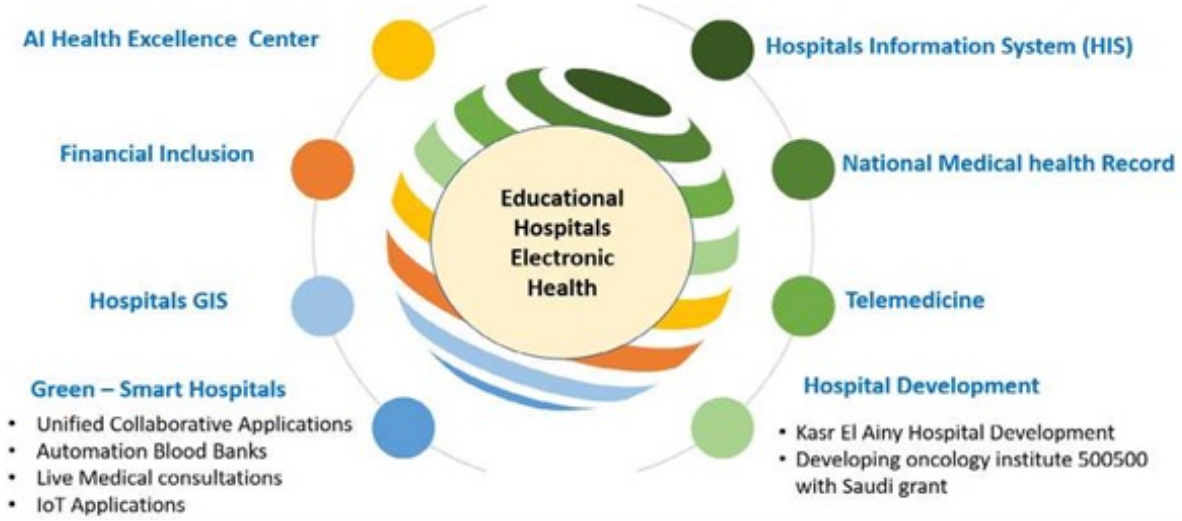


FIGURE (5 - 12) : ELECTRONIC HEALTH AT EDUCATIONAL HOSPITALS

The following are visionary projects to improve the sustainability and health of university educational hospitals.

Green – Smart Hospitals

The council has launched a strategy to implement the Green – Smart Hospital approach in all its hospital development projects. A green hospital can be defined as utilizing natural resources in an efficient manner while enhancing patient wellbeing. A green hospital consumes less energy, conserves water, utilizes greener waste disposal methods, and prioritizes chemical safety, The term "green hospitals" has become a vital component of the integrated system that Egypt seeks to implement in its green transition. Smart hospitals, on the other hand, take a holistic approach to infrastructure modernization, and the integration of digital and physical assets in a unified framework that ties the institution's various clinical and business workflows and assets together. Accordingly, the council has started a strategy for incorporating the Green – Smart Hospital approach in its hospital development projects. This includes the implementation of technologies such as unified collaborative applications, automated blood banks, IoT applications and live medical consultations.

The council has started a strategy for the implementation of a Geographic Information System (GIS) in its

FIGURE (5 - 13) : GREEN-SMART HOSPITAL

digitalization strategy. This is a computer system that analyses and displays geographically referenced information. In terms of analysis, a GIS offers the opportunity to use spatial data to answer questions. For example: where are disease rates higher or lower? How far is it to the nearest healthcare facility? Or where can we best locate a new syringe exchange location? The descriptive data also allows the user to search and display associated attributes (e.g., number of hospital beds, types of specialized services offered, etc.).

AI Health Excellence Center

The council has started implementing the concept of excellence centers which are specialized programs within healthcare institutions to supply exceptionally high concentrations of expertise and related resources centered on specific medical areas and delivered in a comprehensive, interdisciplinary fashion. These afford many advantages for healthcare providers and the populations they serve, which will lead to realizing full value from centers of excellence.

Hospital Information System (HIS)

The council has started implementing different information systems to improve the digitalization process outlined in the strategy. The term Hospital Information Systems (HIS) refers to the component of health informatics that places focus largely on the administrative, financial, and clinical needs of hospitals. These systems augment the ability of healthcare professionals to coordinate care by providing a patient's health information and visit history at the place and time that it is required. So basically, HIS is designed to manage patients and their related information in a centralized way via electronic data processing and to predict health status within the hospital environment.

FIGURE (5 - 14) : HOSPITAL GEOGRAPHIC INFORMATION SYSTEM GIS

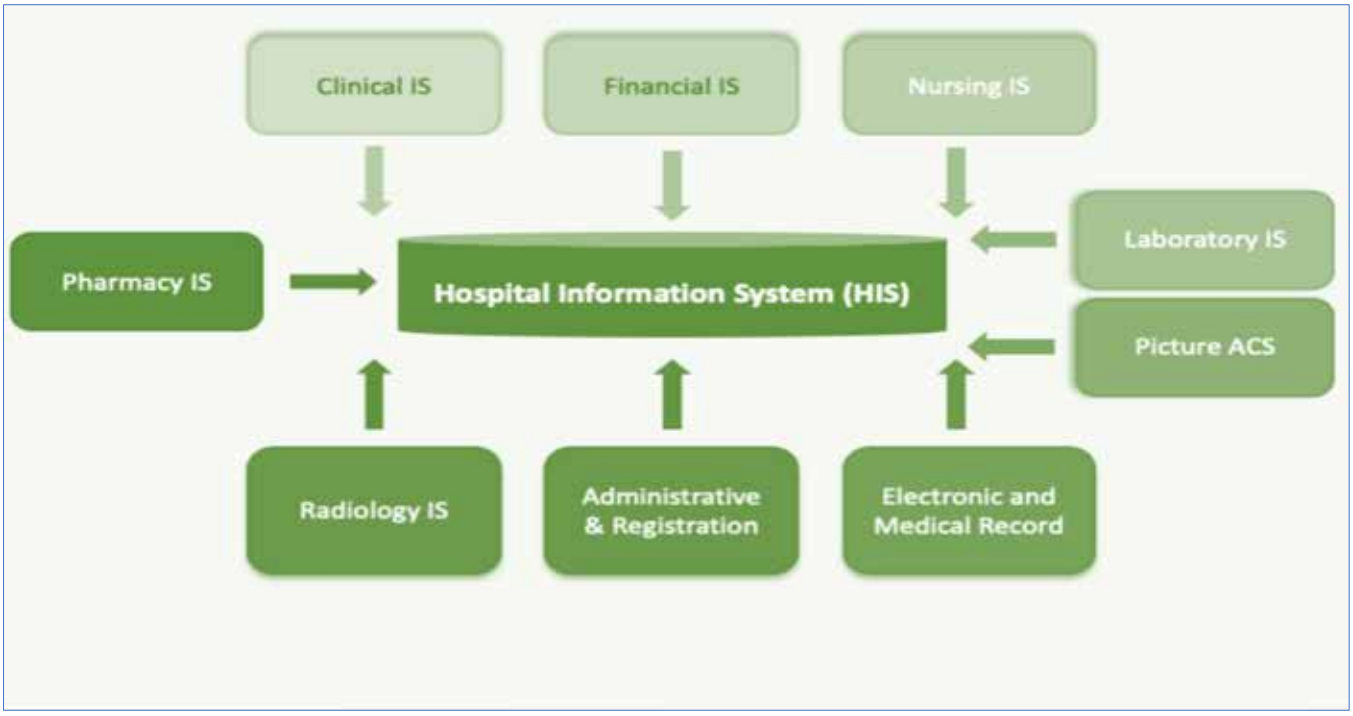


FIGURE (5 - 15) : HOSPITAL INFORMATION SYSTEMS (HIS)

National Electronic Health Record

The council is also committed to the creation of a national electronic health record (EHR). Electronic health records (EHRs) are real-time, patient-centered records that provide immediate and secure information to authorized users. EHRs typically contain a patient's medical history, diagnoses and treatment, medications, allergies, immunizations, as well as radiology images and laboratory results. A National Electronic Health Records system is most-often implemented under the responsibility of the national health authority and will typically make a patient's medical history available to health professionals in health care institutions and provide linkages to related services such as pharmacies, laboratories, specialists, and emergency and medical imaging facilities.

FIGURE (5 - 16) : THE NATIONAL ELECTRONIC HEALTH RECORD (EHR)

Telemedicine

The council has acknowledged the importance of telemedicine after the pandemic as it enables video or phone appointments between a patient and their health care practitioner with benefits in terms of both health and convenience. More health care providers are offering to "see" patients by computer and smartphone. Telemedicine, also known as telehealth, offers many advantages, including:

- Comfort and Convenience
- Control of Infectious Illness
- Better Assessment
- Family Connections
- Primary Care and Chronic Condition Management

FIGURE (5 - 17) : TELEMEDICINE

Financial inclusion

Having access to affordable and quality healthcare services without facing financial barriers is planned. So, financial inclusion involves providing financial support mechanisms, such as health insurance or government subsidies, to ensure receiving the necessary medical care.

Hospital Development

Hospital development refers to the continuous improvement and advancement of healthcare facilities and services through the integration of electronic health technologies. For example, Kasr Al-ainy hospital development and developing oncology institute 500500 with Saudi grant.

5.2.3 The Social Dimension

The social dimension is concerned with the establishment of well-structured social systems that provide aspects of support for those affiliated to the institutions of higher education. It seeks three main objectives: human resource development, solidarity and care within society, and collaboration with NGOs to address social challenges.

5.2.3.1 Human Resource Development

Investing in human resources involves offering programs for rehabilitation and training and investing in minds to minimize "brain drain" through immigration. HEIs aim to provide quality education and training that equip students with the knowledge, skills, and competencies needed for job market demands. In this manner, human resource development contributes to the growth and development of economic capacity.

5.2.3.2 Solidarity and Care within Society

Solidarity and care within society is to be realized through community engagement. Students can experience first-hand the inter-connections between environmental issues and develop their understanding of how individuals and communities interact. Furthermore, community sites provide ideal locations for class projects, applied and service learning, and internships. Universities may further the co-creation of community change by contributing with research, technical skills, human resources, and emerging knowledge. The various faculties at a given university could offer theoretical, research, and technical knowledge, that would usefully support community members in designing and implementing projects. They can provide experiential learning opportunities and promote inclusive and diverse learning environments.

In addition, universities have an important role in contributing to sustainable development through educating their students to address local and global social challenges and preparing them to work towards creating a more equitable and inclusive society. In addition, job security and employee satisfaction are major factors that should be addressed. Accordingly, HEIs also need to build capacity within their own structures and systems so that they can operate more sustainably, and finally, they have a role to play externally by contributing (through education and research) to building capacity with stakeholders across their communities.

5.2.3.3 Social Solidarity NGOs

HEIs can collaborate with non-governmental organizations (NGOs) through joint research projects, community engagement initiatives, and student volunteering programs. Mutual support between HEIs and NGOs can be very beneficial, where the former provide expertise and resources to address issues related to poverty, social justice, well-being, education, and more. Through these partnerships, HEIs can contribute to social development as well as economic advancement.

5.3 SDG INTEGRATION IN HIGHER EDUCATION

HEIs have an important role to play in the implementation of education for sustainability. They are responsible for the formation of next-generation professionals, which will have a decisive impact on their different professional contexts and social engagements. An institutional culture of sustainability increases the awareness of university staff, local, and broader communities by implementing sustainable campus practices. Also, the development of a sustainability culture through the different activities carried out on campus, e.g., institutional framework and assessment, research, education, experiences, and operations and outreach, have a substantial impact on the outside world, namely on the environment, economy, society and stakeholder awareness of sustainability aspects.

Higher education contributes decisively to SDG implementation, but especially to Goal 1 (end poverty in all its forms everywhere), Goal 3 (ensure healthy lives and promote well-being for all at all ages), Goal 5 (gender equality), Goal 8 (decent work and economic growth), Goal 12 (responsible consumption and production), Goal 13 (climate change), and Goal 16 (peace, justice, and strong institutions). Higher education has a tremendous impact on student habits and contribution to a prosperous society.

Considering their key role in education and research, HEIs possess great potential for integrating SDG and shaping a sustainable society. According to the integrated sustainability model, universities should align their core functions, operations, and role within society with the sustainable development concept. To support the integration of SDG in higher education, HEIs will adopt a number of initiatives:

Encouraging Research for Sustainable Development: This could be accomplished through the advocacy of interdisciplinary and transdisciplinary research to develop the innovative technologies and the system-oriented know-how necessary to realize sustainable development. In the context of sustainable development, the transdisciplinary approach takes on an ever-increasing role. This approach studies the complex relationships between humans and the environment and integrates both scientific and everyday life problems in the research process as well as including the relevant practical actors.

Teaching Sustainable Development: Besides the generation of knowledge, another core task for a university is the transfer of knowledge. Research results should be conveyed to the next generation and to the scientific as well as the non-scientific audience. Together with Education for Sustainable Development (ESD), universities as educational institutions have the task of providing people with knowledge and skills to enable them to participate in shaping a future that is economically, ecologically, and socially sustainable. Education at universities is assessed by the following indicators:

- Competence of the teachers in sustainable development topics
- Number of sustainability degree programs
- Competence in the areas of sustainable development or ESD
- Continuing education classes for sustainable development or ESD
- Number of courses related to sustainable development (mandatory and optional electives)
- Reporting on the focus of the course catalogue on sustainable development

Engaging and sharing information with international networks: Collaboration and knowledge exchange on a global scale are essential for addressing complex challenges and creating a more sustainable future. Thus, engaging and sharing information through collaborative research projects and partnerships with international institutions that address SDGs is important. These projects can involve different universities working together to find innovative solutions to global sustainability challenges. Through research collaboration, universities can contribute to the knowledge and achievement of SDGs.

Green campuses and supporting local sustainability efforts: Green campuses follow the implementation of green building standards for new construction and renovated buildings. They support the integration of sustainable practices into campus operations. Design and construction prioritize energy efficiency, indoor air quality, use of sustainable materials, and accessibility. In addition, collaboration with local communities and organizations to support local sustainability efforts is encouraged. Universities can engage in community outreach programs, participate in environmental initiatives, and provide expertise and resources to address community challenges. This collaboration helps foster a sense of shared responsibility and enhances the impact of sustainability efforts.

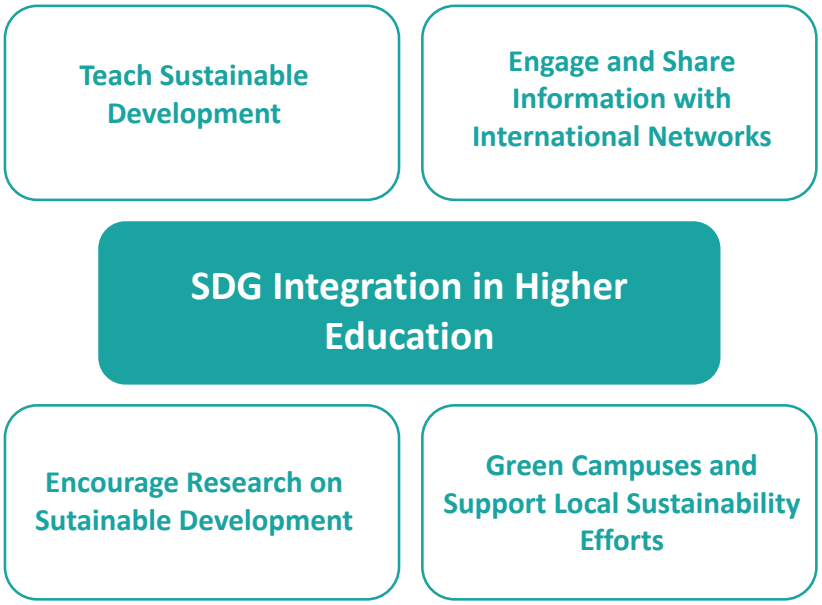


FIGURE (5 - 18) : SDG INTEGRATION IN HIGHER EDUCATION

5.4 REGIONAL CONSORTIUM OF UNIVERSITIES

Development agencies and universities invest great effort in building stronger higher education systems. If these efforts are separate and uncoordinated, higher education leadership will be absent from some of the most influential development advocacy networks and education working groups. These can be missed opportunities, not only for the development of the higher education sector, but also for the rest of the education sector to benefit from higher education sector knowledge and skills. All actors should take steps to make sure that higher education stakeholders are members of key advisory boards and participate in the implementation of Agenda 2030 in the next decade. Regional cooperation is another strategy to build higher education sector capacity. Even though the 2030 agenda is global, national progress in many areas is more likely to benefit from regional partnerships and cooperation.

Most public sector organizations, including HEIs, now operate within a framework reliant on partnership for the successful delivery of services and projects. In recent years there have been considerable benefits of using partnerships. More specifically, in relation to education and learning it has also been recognized that effective working partnerships will be crucial to the success of the government's lifelong learning strategic initiative.

Accordingly, the proposed regional consortium for integrating universities has a set of objectives to reach:

- Establish companies and entities that support the private sector.
- Develop the social solidarity system among university employees.
- Create partnerships with international universities to increase income.
- Create programs and educational facilities with return on investment.
- Develop a system for self-sufficient increase in income sources.
- Establish entities with return on investment.

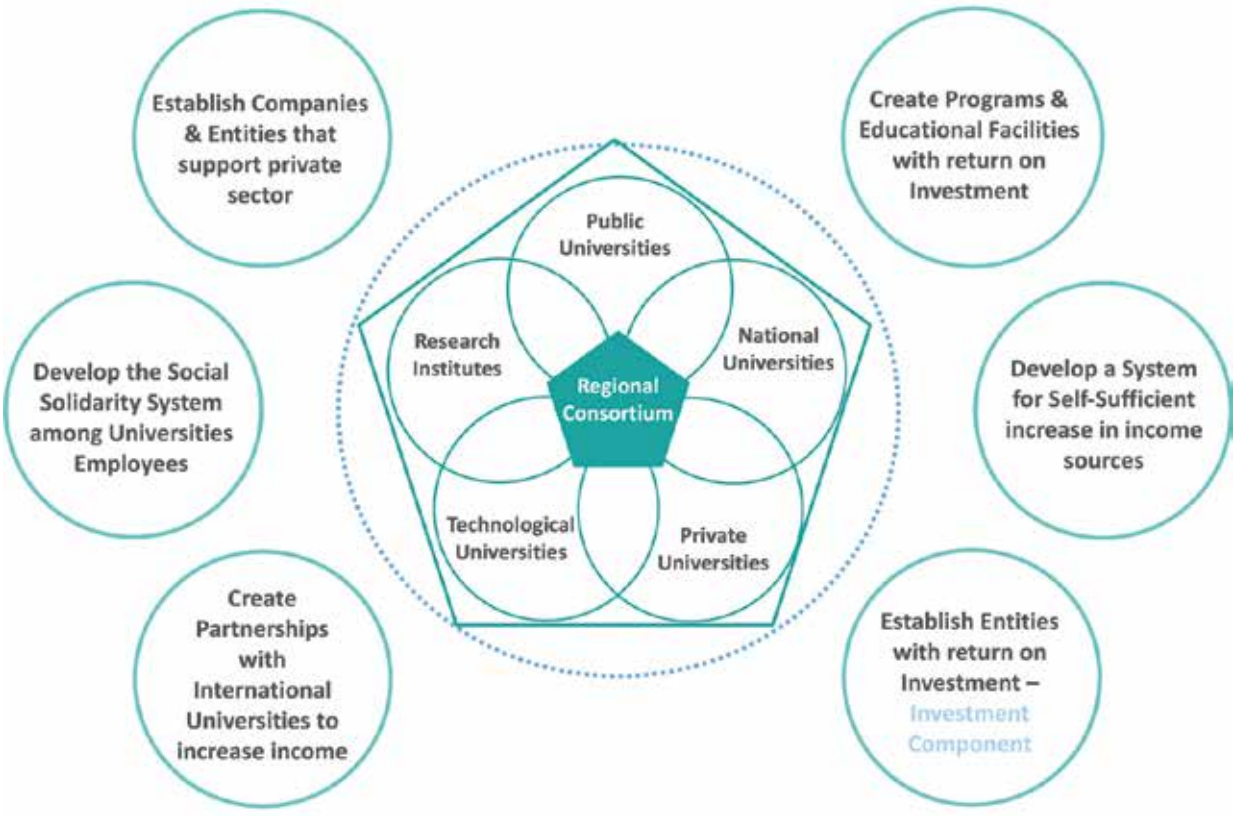


FIGURE (5 - 19) : THE REGIONAL CONSORTIUMS AND THEIR CONTRIBUTION TO SUSTAINABILITY

5.5 THE ESSENCE OF SUSTAINABILITY

Universities must recognize that they are not isolated islands in society; they need to be open to knowledge generated outside their walls, whether from other HEIs, companies, government, or civil society. This open-minded perspective can help university faculty create and foster implementation of new, more sustainable paradigms in all their activities. University systems should include the following elements: collaborating with other universities; fostering interdisciplinarity; making sustainable development an integral part of their institutional framework; creating on-campus, sustainable development life experiences; and "Educating-the-Educators." Universities and their faculties must catalyze and ensure that sustainable development is the 'Golden Thread' throughout all university systems.

At its heart must be synergy and complementarity, harnessing individual academic interests and engaging these in grounded projects of real value to the wider community. In specific terms, partnerships can enable various practical outcomes by-passing the sterility of many traditional approaches to academic work. For example, joint funding projects may allow access to new support opportunities, previously not available to HEIs. Contributions from academics and practitioners towards the preparation of joint projects can help ensure they combine academic rigor with grounded applied objectives. Collaborative work with community groups can utilize voluntary input to research projects enabling access to local expertise and information.

In this sense, a university's commitment to sustainable development has a direct impact on its international reference. Universities can enhance their reputation, attract international collaborations, promote knowledge exchange, attract talented students and staff, contribute to global sustainability efforts, and create a diverse and inclusive learning environment. All these factors contribute to the university's international reference and position it on the global map.

Arab Republic of Egypt

وزارة التعليم العالي والبحث العلمي

Ministry of Higher Education
& Scientific Research

6. INTERNATIONAL REFERENCE

6.1 INTRODUCTION

Globalization, international collaboration, and knowledge exchange have become paramount priorities in an increasingly interconnected world. The concept of **"international reference"** has emerged, highlighting institutions that have achieved global recognition for their academic excellence, research contributions, and international engagement.

The designation of international reference is not merely based on reputation, but also on a comprehensive evaluation of various factors. These factors may include the institution's academic programs, research output, faculty expertise, international rankings, global partnerships, and student mobility initiatives. Institutions that attain this prestigious status demonstrate a commitment to fostering global perspectives, nurturing multicultural understanding, and advancing knowledge across borders.

This principle aims to promote Egypt's universities as prominent global players, serving as benchmarks for excellence in higher education. Achieving this goal is envisioned through two tracks: 1) improving the ranking of the Egyptian universities within international classification systems and 2) working on achieving university accreditation by relevant local and international bodies. This implicitly aims at raising the competitiveness in terms of the quality of education and the price of the educational service provided. It would also have clear implications for attracting international students, scholars, and researchers, as well as encouraging their robust collaborations with academic institutions worldwide. In tandem, a local classification can be created to motivate universities to work on the challenges of the local community.

It is the role of the vice president for international cooperation to facilitate this task based on the plans and recommendations in this document, which provide the basis for HEIs to strengthen Egypt's position as an international global education hub.

6.2 WHY IT MATTERS: COMPETITIVENESS

The education sector has one of the highest multiples. When funds are invested in the education sector, they generate income not only within the sector but also from other peripheral sectors, making investment in education an attractive international global trend. Competition between countries and related hubs has intensified to reap the full benefits of investment in education. HEIs in Egypt have progressed significantly, from importers of ideas, structures, and models of higher education to globally connected players recognized internationally for academic and research excellence.

To further enhance competitiveness, the Ministry of High Education and Scientific Research (MOHESR) is working on improving the end-to-end international student experience, increasing brand visibility, and strengthening existing and new markets for international students. Key initiatives include increasing the proportion of postgraduate international students and students from high priority markets by diversifying and raising the quality of niche programs and strengthening the promotion and marketing of Egypt's higher education system through targeted measures such as hosting major international education conferences and international events as well as other events that have the potential to capture the interest of the global higher education society. Another key initiative is the Egyptian Knowledge Bank (EKB) that was launched by President Abdel-Fattah El-Sissi during the National Science Day of 2014. EKB started to launch several national projects concerned with educational development. Like many countries, Egypt began with building local HEIs for the benefits of its citizens and local students. However, based on the latest ministry data, Egypt is now among the top recruiters of international students globally, with enrolment for international students increasing since the launch of the National Higher Education Strategic Plan 2007-2020. Egypt is on the proper track to position itself as an international student hub and efforts must continue to enhance its standing.

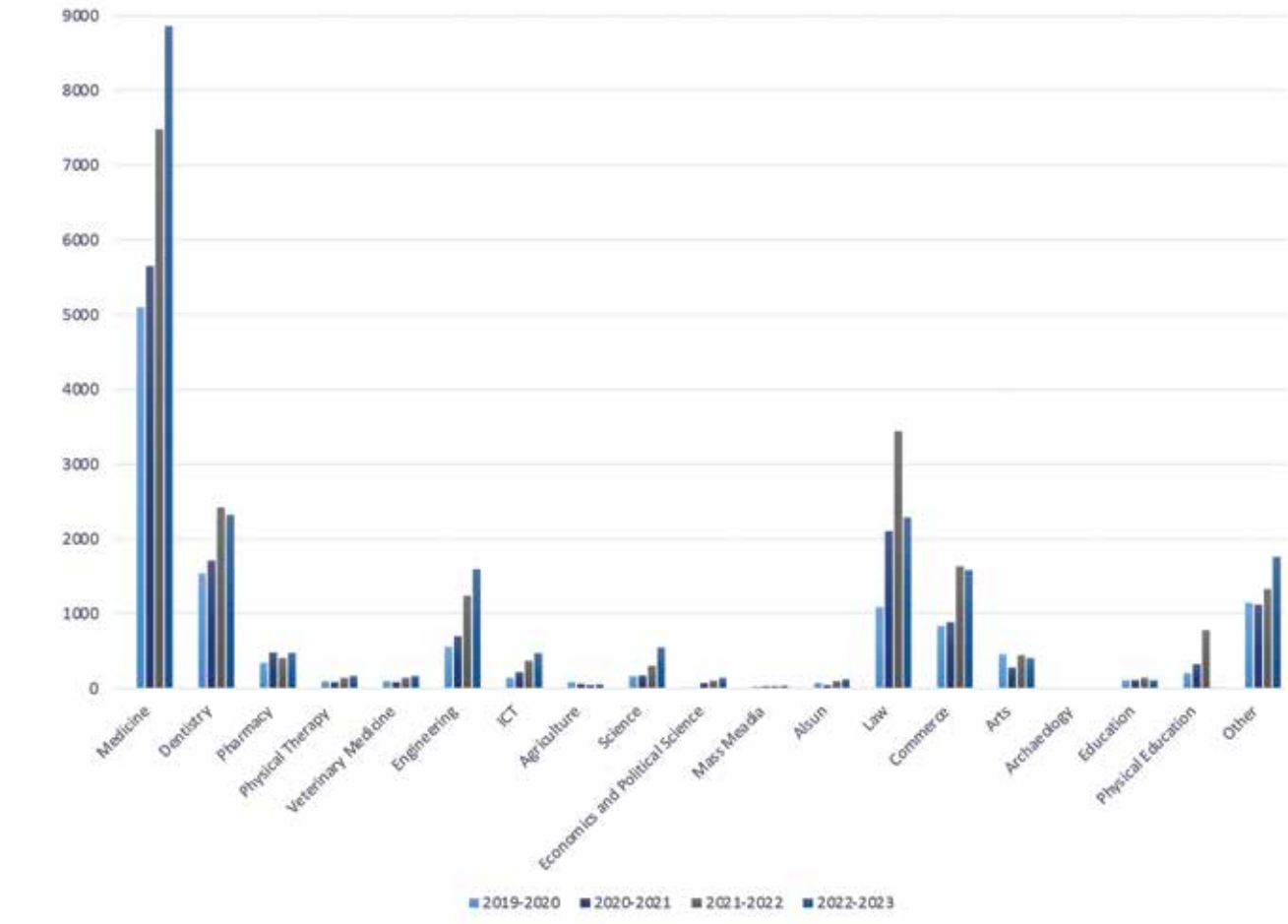


FIGURE (6 - 1) : NUMBER OF INTERNATIONAL STUDENTS ENROLLED IN HIGHER EDUCATION IN EGYPT FROM 2019 TO 2023

Egypt has initiated and intensified efforts in international student recruitment. The introduction of private HEIs has also enabled rapid expansion by the private sector, which now plays a key role in receiving international students. Additionally, HEIs in Egypt have seen an increase in their international academic staff. Egypt also currently hosts approximately 10 international branch campuses and can expect a further rise in the number of international students and staff. The presence of international students and staff drives HEIs in Egypt to introduce “global, international, and intercultural” dimensions into their teaching, learning, and research sectors. It also brings crucial changes to the domestic higher education landscape.

Scientific research can play a vital role in spurring higher education. The MOHESR therefore encourages and facilitates the establishment of international research laboratories with HEIs, research centers, industry, and organizations as co-collaborators. This initiative can build domestic capacity for high impact research projects and enhance Egypt’s profile as a global knowledge contributor.

6.3 THE POTENTIAL OF EGYPTIAN UNIVERSITIES: AN ATTRACTIVE DESTINATION FOR INTERNATIONAL STUDENTS

Egyptian universities are increasingly attracting international students due to several factors that make them preferred educational destinations:

a. Strategic Location: Egypt’s geographical location serves as a gateway to Africa, the Middle East, and Europe. International students studying in Egypt can easily travel and explore nearby countries and cultures during their academic breaks, further enriching their educational experience.

b. Affordable Education: Compared to many other countries, the cost of education in Egypt is relatively affordable. Tuition fees and living expenses are often lower, making it an attractive option for international students seeking quality education at a more affordable cost.

FIGURE (6 - 2) : FACTORS THAT ATTRACT INTERNATIONAL STUDENTS TO EGYPTIAN UNIVERSITIES.

c. Historical and Cultural Significance: Egypt is renowned for its rich history and cultural heritage. The country is home to ancient wonders and numerous archaeological sites. International students are attracted to studying in Egypt to immerse themselves in this unique cultural environment and explore its historical landmarks.
d. English-taught Programs: Many Egyptian universities offer international programs taught in English, especially at the graduate level. This makes it easier for international students whose first language is English to pursue their studies in Egypt without language barriers.
e. Academic Reputation: Several Egyptian universities have established a strong reputation for academic excellence and research output. Institutions such as Cairo University, Ain Shams University, and Alexandria University are well-known within the region and internationally and consistently attract students seeking quality education.
f. Research and Innovation Opportunities: Egyptian universities actively engage in research and innovation initiatives. They collaborate with international partners, participate in research projects, and contribute to scientific advancements in various fields. International students have the opportunity to be part of these research endeavors and contribute to knowledge creation.

6.4 INTERNATIONAL REFERENCE PILLARS

There are two main pillars for international referencing for Egyptian HEIs: University ranking and university accreditation. Recently in March 2022, ranking of research centers has also been initiated with the participation of Egyptian Minister of Higher Education & Scientific Research, Elsevier, SCImago representatives and stakeholders from the region.

FIGURE (6 - 3) : INTERNATIONAL REFERENCE PILLARS

Egyptian universities must uphold both pillars to be internationally qualified to compete with global universities and to serve as influential models of excellence, attracting students, scholars, and

researchers from all corners of the world. Through their commitment to internationalization, these institutions contribute to the development of a global community of learners, fostering cultural understanding, and promoting collaboration across borders.

6.4.1 Pillar 1: University Ranking

There is a new era in higher education, characterized by global competition, in which university ranking systems have assumed significant importance. Globalization, the progress towards a knowledge-based economy and growing interest in information related to HEIs are all factors that have contributed to the remarkable popularity of ranking systems.

The main aim of this pillar is to make Egyptian HEIs part of these different international ranking systems. This can be achieved via two parallel tracks.

FIGURE (6 - 4) : TRACKS TO ACHIEVE INTERNATIONAL RANKING

The first track involves fostering international collaboration and partnership with prestigious universities and institutions around the world. In addition, it also focuses on offering double degrees or joint degrees through importing international programs or developing new international interdisciplinary programs. University international rankings encourage collaborations and partnerships between institutions from different countries. Highly ranked universities are often sought-after partners for research collaborations, joint degree programs, and knowledge exchange initiatives. Collaborations with internationally recognized universities enhance the global reputation and impact of a university, facilitating interdisciplinary research and promoting cross-cultural understanding.

International joint, double, and consecutive degree programs have an important role to play in the current landscape of higher education. They also have the potential to become more numerous and influential in the coming years. As an internationalization strategy, these programs address the heartland of academia, which is the teaching and learning process and the production of new knowledge between and among countries. These programs are built on the principle of deep academic collaboration with important benefits to individuals, institutions, and national and regional education systems.

Overall, the most important features of a joint degree program are the strengths that each institution brings to the program. It also gives students the opportunity to benefit from a program that draws on the teaching, curricular and research expertise of two or more institutions located in different countries. The students experience the blend of two educational environments. This structure helps integrate different pedagogical approaches and leverages the academic support of multiple academic advisors and institutions. In addition, these programs double the professional network. Students establish contact with academics, students, and professionals within both programs enlarging their network within a short timeframe and creating contacts that can be useful to them both during and after their studies.

The second track is to enhance the global standing and reputation of Egyptian universities based on a range of international ranking systems that establish a globally recognized benchmark for universities and highlight those institutions that have achieved excellence in teaching, research, and overall academic performance. By attaining a high position in international rankings, universities gain recognition for their quality and become more attractive to prospective students, faculty, and international partners. It is important for each university to identify its strengths and weaknesses according to the ranking system criteria, and to work on improving the areas that need attention.

The most famous ranking systems include Shanghai Academic Ranking of World Universities (ARWU); Times Higher Education (THE), QS World University Ranking, Webometrics Ranking of World Universities, and Taiwan Higher Education Accreditation and Evaluation Council (HEEACT).Raising the international ranking requires a strategic approach and consistent efforts in the long term in several key areas:

6.4.1.1 The Enhancement of Academic Quality

Over the past ten years, Egyptian universities have focused on improving their international academic ranking. There is an emphasis on enhancing academic quality by recruiting and retaining top-tier faculty members, encouraging research productivity, and maintaining high teaching standards. Given the importance of publication and research output as a metric of university ranking, publishing in reputable journals and conferences is highly encouraged, and the development of a research culture within the universities is promoted. Faculty development is another area of focus through the creation of professional development opportunities for faculty members, such as attending conferences, workshops, and training programs and supporting their participation in academic networks and collaborations. Faculty members are encouraged to collaborate in external research funding and grants.

On the other hand, the government is supporting the development of critical, state-of-the-art infrastructure and facilities by investing in modern research facilities, laboratories, and libraries to enhance and support academic and research activities and contribute to a positive learning and research experience for students and faculties.

6.4.1.2 International Registration for Students' Equality and Diversity

Another important dimension of international ranking for international reference is the international registration systems in Egyptian universities. Universities have their local registration system but they must adopt new international registration systems. To earn international registration, they need to have a connectivity platform that understands the importance of international collaboration. need to start attracting international students from different countries. This ensures student diversity which enhances the university's global appeal and fosters a multicultural learning environment.

FIGURE (6 - 5) : THE ADOPTION OF AN INTERNATIONAL REGISTRATION SYSTEM

By prioritizing student skills and qualifications in the registration process, universities can ensure that students are placed in programs that match their abilities and aspirations. This approach promotes a more personalized and meaningful educational experience, ultimately preparing students for successful careers and lifelong learning. Several strategies can be implemented to achieve this goal:

- Comprehensive Application Process: Develop a comprehensive application process that allows students to showcase their skills, qualifications, and achievements. This may include submitting academic transcripts, recommendation letters, personal statements, portfolios, or other evidence of their abilities.
- Skills Assessment: Implement skills assessment methods during the application process to evaluate student proficiency in specific areas. This can involve standardized tests, interviews, practical demonstrations, or online assessments to gauge skills and qualifications accurately.
- Personalized Guidance: Offer personalized guidance and counseling services to prospective students. Assign advisors who can help students identify their strengths, interests, and career goals, and guide them in selecting programs that align with their skills and qualifications.
- Admissions Interviews: Conduct admissions interviews to assess students' interpersonal and communication skills, problem-solving abilities, and overall suitability for the chosen program. These interviews provide an opportunity to evaluate students beyond their academic qualifications.
- Recognition of Non-academic Achievements: Recognize students' non-academic achievements, such as participation in extracurricular activities, community service, leadership roles, or entrepreneurial ventures. These achievements can indicate valuable skills and qualities that go beyond academic performance.
- Flexible Program Structures: Design flexible program structures that accommodate students with varying levels of skills and qualifications. Offer different program entry points, such as foundation courses or advanced placement options, to ensure students are appropriately placed based on their abilities.
- Specialized Programs for High-achieving Students: Create specialized programs or tracks for high-achieving students who demonstrate exceptional skills and qualifications. These programs can provide advanced coursework, research opportunities, or mentorship programs to further develop their talents.

To encourage local students to seek international registration, several steps can be taken:

- Promote Study Abroad Programs: Actively promote study abroad programs and exchange opportunities to local students. Collaborate with foreign universities and organizations to offer scholarships, grants, or other financial incentives for local students to pursue a portion of their studies abroad.
- Establish International Partnerships: Foster partnerships and collaborations with renowned international universities and institutions. This can involve signing memorandums of understanding (MoUs) or cooperation agreements to facilitate student exchanges, joint research projects, and academic programs that offer dual degrees.
- Expand English Language Programs: Strengthen English language education and proficiency among local students. Offer specialized language courses, workshops, or certification programs to enhance students' English language skills, as it is often a requirement for international registration.
- Increase International Exposure: Organize international conferences, seminars, and academic events in collaboration with international partners. Invite renowned international scholars and researchers to deliver lectures or participate in academic forums, thereby exposing local students to global perspectives and fostering international networking opportunities.
- Establish Internationalization Offices: Set up dedicated internationalization offices or departments within universities. These offices can provide information, guidance, and support to local students interested in international registration, including assistance with application processes, scholarship opportunities, and guidance on selecting suitable universities abroad.
- Facilitate Credit Transfers: Establish clear guidelines and procedures for credit transfers between domestic and international universities. This allows local students who have completed part of their studies abroad to seamlessly integrate their international coursework into their local degree programs.
- Support International Research Opportunities: Encourage local students to engage in international research collaborations and encourage participation

in international conferences, research symposiums, and exchange programs. Provide funding or grants specifically targeted at supporting local students' participation in international research initiatives.

6.4.1.3 Reputation Management

Effective marketing strategies can help promote the university's accomplishments, strengths, and unique attributes. This can involve highlighting success stories, research breakthroughs, and notable achievements of faculty members and students. Maintaining connections with alumni is also important as their success stories can be useful to enhance the reputation of the institution. Highlighting the university's academic integrity is critical, as is linking business-oriented courses with an employability component and an enhanced student experience. It is also vital to pay attention to communication platforms such as websites and social media accounts to increase reach and connect with the intended audience.

6.4.2 Pillar 2: University Accreditation

The second pillar in international reference focuses on improving the quality of education to achieve international accreditation of universities. Accreditation ensures that universities meet certain standards and criteria established by accrediting bodies. It is the procedure by which a private or a state-independent actor evaluates the quality of an institution or a study program with the view to certify that it meets specific and pre-defined standards. The result of the accreditation procedure can provide the awarding of a status, a recognition, or a license for operation for a certain period. It may include an initial self-study and external evaluation by experts. Its primary objective is to maintain and improve the quality of higher education institutions, study programs, and courses.

International accreditation is independent of the national standards set by ministries of education that institutions must meet in the countries where they operate. International accreditation is usually done by an independent, non-governmental agency that sets its own standards. For students, attending an internationally accredited institution can be important if they plan to continue their education overseas. Another benefit of the accreditation path is that it encourages the university or program to evaluate its performance against international standards, and then to mobilize its energies to work on improving its weaknesses and ensuring continuous development.

Since 2002, Egypt has been applying a new quality assurance system for higher education. It consists of an internal quality assurance system operated by individual higher education institutions and an independent external quality assessment system based on peer review. A system has been created to develop appropriate mechanisms to evaluate the performance and control the quality in the higher education system as part of the framework of qualitative development in the HE system in Egypt. This system has been developed through the implementation plan of the strategic plan for higher education 2002–2017, and during the implementation of Phase I (2002–2008) and Phase II (2008–2012) and involves three main achievements:

- The establishment of the National Authority for Quality Assurance and Accreditation of Education (NAQAAE)
- The development of mechanisms to ensure continuity of application of internal quality controls in Egyptian universities.
- The development of national academic reference standards for higher education programs.

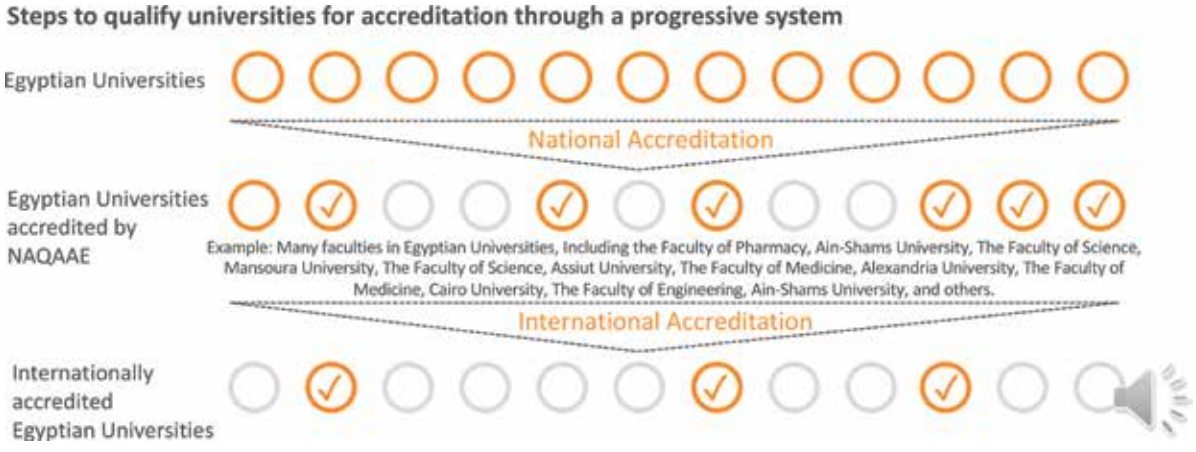


FIGURE (6 - 6) : STEPS TO QUALIFY UNIVERSITIES FOR ACCREDITATION.

As can be seen from the above figure, university accreditation starts with local qualification for national accreditation followed by international accreditation. An accredited university is an international university that grants its graduates a certificate that is recognized worldwide and provides them with the chance to compete in the international market.

An accreditation plan based on self-assessment is created with a detailed outline of the steps, timeline, and responsible parties for each accreditation requirement. This plan addresses areas of improvement, necessary policy changes, resource allocation, and specific actions required to meet the accreditation standards while establishing clear objectives and key performance indicators to track progress.

In addition, there are three main types of university accreditation, which serve as a form of quality assurance and validation of an institution's educational programs and services. The accreditation of the institution, the accreditation of the programs and the accreditation of the management of such institutions. Each type of accreditation is provided by different internationally recognized accreditation systems:

- Institutional Accreditation by associations that define, maintain, and promote educational excellence. It involves the examination of each institution, rather than specific programs within institutions. Institutional accreditation is granted by the association for a period of years, with a midway periodic review.
- Program Accreditation that ensures worldwide recognition. Graduates of accredited programs are eligible to register as professionals in many countries around the world after passing the required examinations.
- Management Accreditation involves a shift in emphasis in institutions, from a focus on the quality of the teacher toward the performance of the institution as a whole; the introduction of new or additional quality control mechanisms in higher education; and the creation of quality assurance systems and performance-related mechanisms in continuing education and training.

FIGURE (6 - 7) : THREE TYPES OF UNIVERSITY ACCREDITATION

6.4.3 Pillar 3: Research Center Ranking

SCImago Lab in collaboration with Elsevier has initiated the Research centers Ranking. This initiative involved the participation of the Egyptian Minister of Higher Education & Scientific Research and stakeholders from the Middle East and North Africa region. Aligned with the vision of the MOHESR in enhancing the quality of research in Egypt, the Ministry has actively participated in this initiative.

The ranking covers 391 research centers across 22 countries in the region. It assesses 16 indicators with three scores in: Research, Innovation, and Society. The ranking model consists of three main components, each with weighted sub-components. 1) Research (40%) evaluates performance, productivity, openness, and collaboration. 2) Innovation (40%) assesses the technical impact. 3) Society (20%) considers web visibility, social networks engagement, and contributions to Sustainable Development Goals (SDGs).

This initiative aims to spotlight the overlooked key role that research centers play in advancing societal benefits. In addition, the ranking considers research activities aligned with the SDGs.

Research centers in Egypt have achieved notable distinctions among other centers in the MENA region. The national research center emerged with the highest overall score of 0.7041 as well as the highest research score of 0.3847. The agriculture research center and the Egyptian atomic energy authority secured the 4th and 5th in the overall score respectively whereas the Egyptian petroleum research institute got the 7th overall score. It is evident the leading of Egypt among other research centers where 4 Egyptian research centers are among the top 10 affirming their excellence on a regional scale.

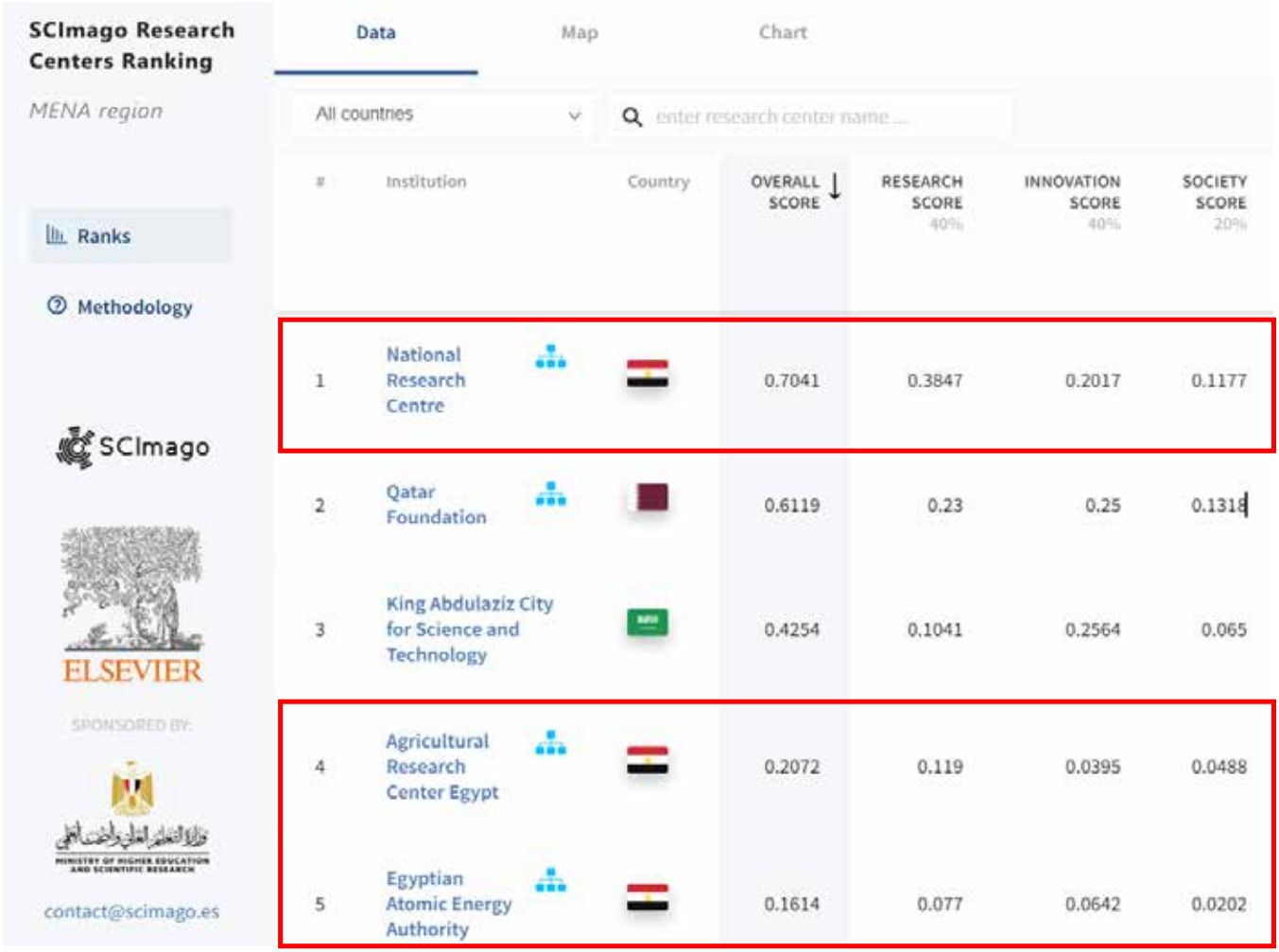


FIGURE (6 - 8) : RESEARCH CENTER RANKINGS ACCORDING TO SCIMAGO

COUNTRIES		Top 20	Top 100	Top 200	Top 300	Total
NORTH AFRICA						
Egypt	EGY	9	34	57	82	89
Algeria	DZA	2	8	24	37	40
Tunisia	TUN	1	18	25	31	35
Morocco	MAR	1	7	13	14	15
Sudan	SDN		1	7	16	28
Lybia	LBY			2	4	5
Mauritania	MRT				3	7
OTHER						
Somalia	SOM			3	7	29
Djibouti	DJI			1	3	6
Comoros	COM				3	9

COUNTRIES		Top 20	Top 100	Top 200	Top 300	Total
MIDDLE EAST						
Qatar	QAT	4	8	10	10	10
Saudi Arabia	SAU	2	6	10	13	17
Kuwait	KWT	1	4	8	11	12
United Arab Emirates	ARE		4	9	12	14
Jordan	JOR		4	8	15	21
Lebanon	LBN		2	10	11	12
Syria	SYR		1	3	6	6
Yemen	YEM		1	2	6	12
Oman	OMN		1	2	3	4
Palestine	PSE		1	1	3	4
Bahrain	BHR			3	3	4
Iraq	IRQ			2	7	12

FIGURE (6 - 9) : SUPERIORITY OF EGYPTIAN CENTERS IN THE MENA REGION ACCORDING TO SCIMAGO RANKINGS

6.5 INTERNATIONALIZING UNIVERSITIES

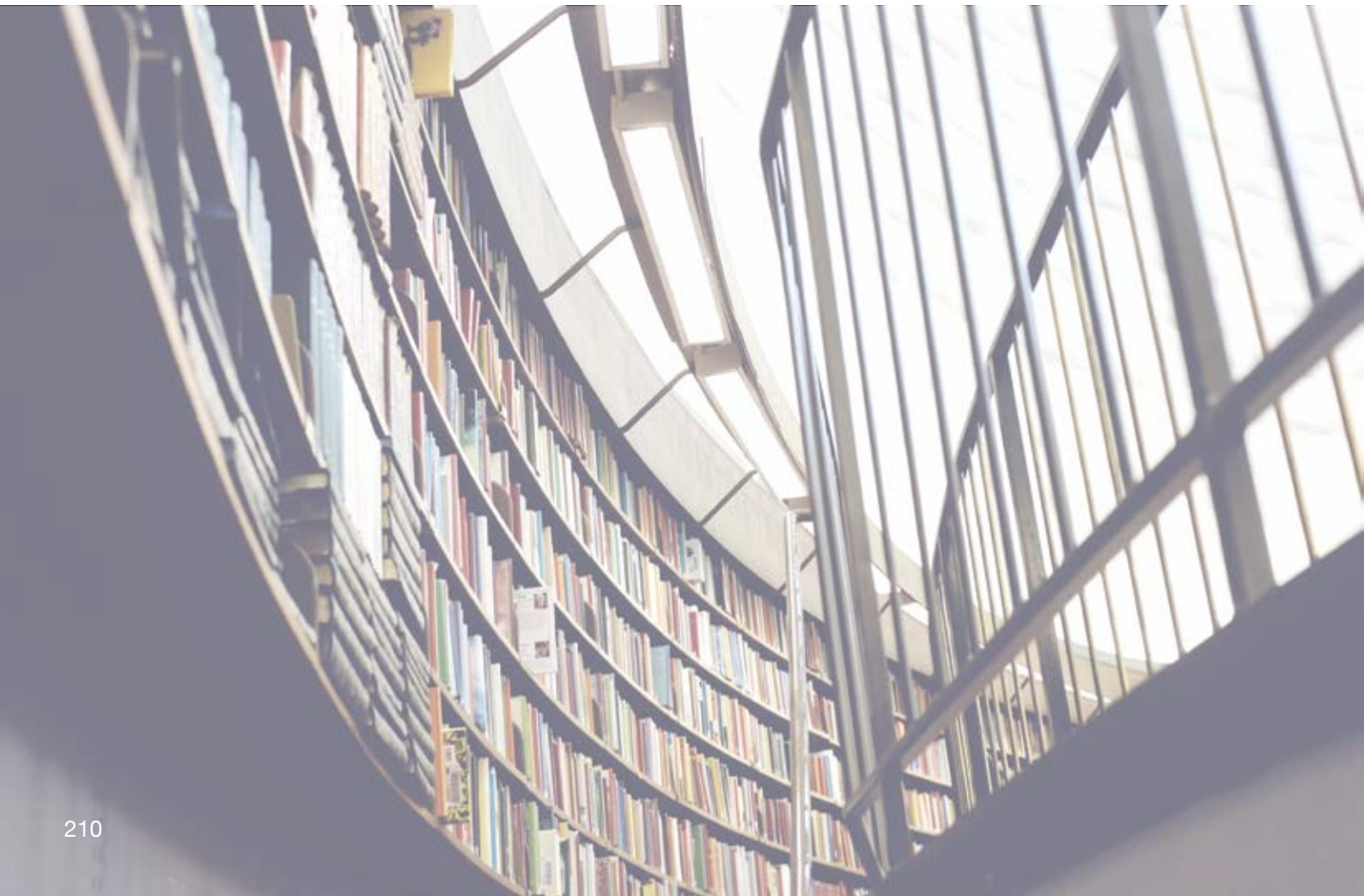
In conclusion, the principle of international reference basically aims to create internationally engaged institutions that are connected to global networks and able to address global challenges. Students can then be prepared to foster cultural understanding and contribute to global knowledge and innovation.

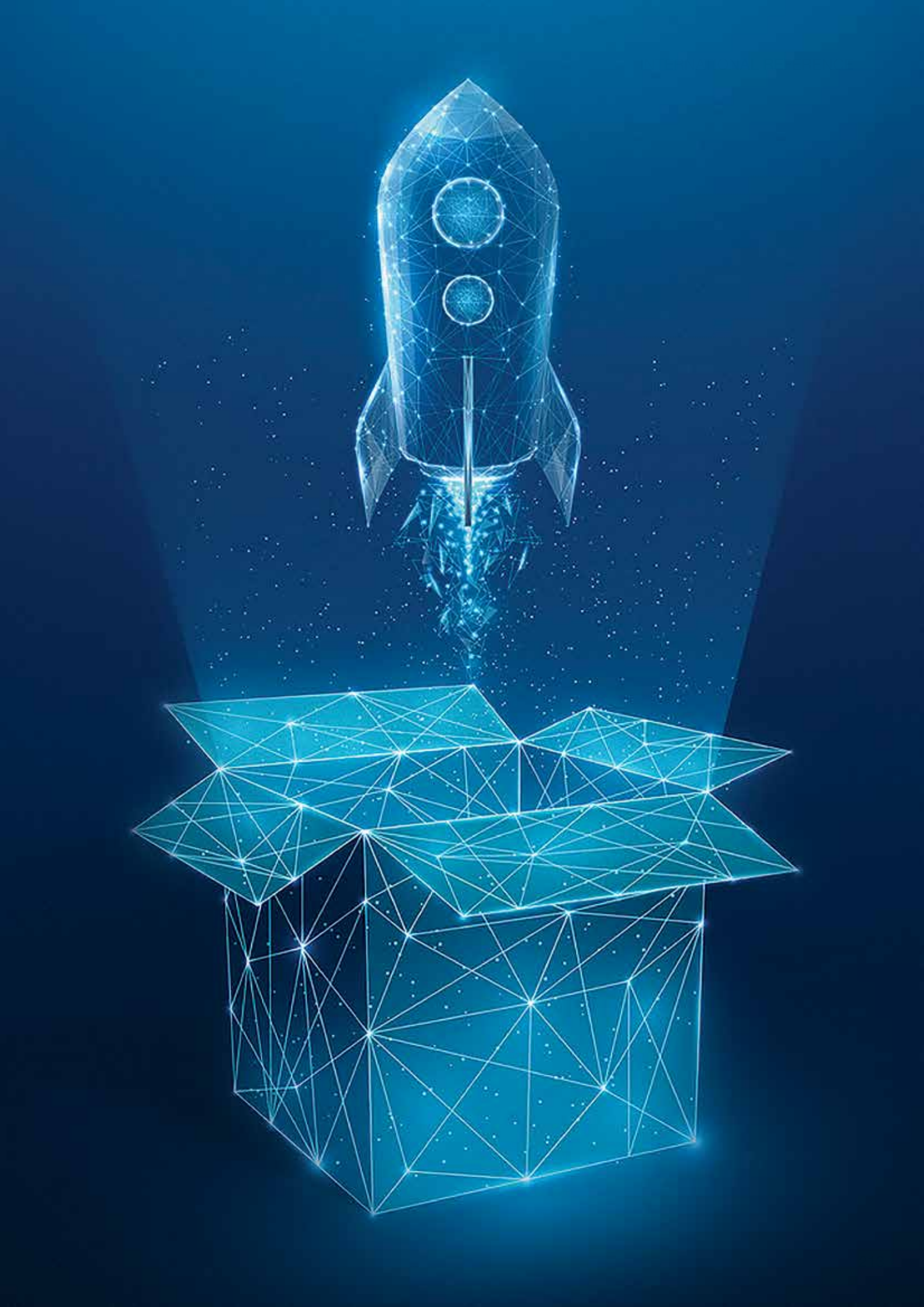
TABLE 1: INTERNATIONALIZING UNIVERSITIES IN LINE WITH EGYPT VISION 2030: EXECUTIVE PLAN

OBJECTIVES	ACTIVITIES AND PROCEDURES	PERFORMANCE INDICATORS
1. CREATE CONTRACTUAL PARTNERSHIPS AND AGREEMENTS WITH FOREIGN AND LOCAL ENTITIES	1. MOTIVATE PARTICIPATION IN INTERNATIONAL PROGRAMS AND PROGRAMS OF THE EUROPEAN UNION. 2. SIGN LOCAL AND INTERNATIONAL AGREEMENTS WITH RECOGNIZED RESEARCH CENTERS AND AUTHORITIES. 3. RAISE AWARENESS OF THE CULTURE OF INTERNATIONALIZATION AND PARTNERSHIP WITH FOREIGN ENTITIES FOR FACULTY MEMBERS, ASSISTANT STAFF, AND ADMINISTRATORS. 4. PARTICIPATE IN INTERNATIONAL INFORMATION NETWORKS AND REGIONAL AND INTERNATIONAL ALLIANCES, SUCH AS THE ASSOCIATION OF MEDITERRANEAN UNIVERSITIES; THE ASSOCIATION OF AFRICAN UNIVERSITIES; THE ASSOCIATION OF ARAB UNIVERSITIES; AND THE ASSOCIATION OF INTERNATIONAL UNIVERSITIES	1. INCREASE IN THE NUMBER OF FACULTY MEMBERS PARTICIPATING IN INTERNATIONAL PROJECTS AND PROGRAMS 2. ACTIVATION OF INTERNATIONAL AND LOCAL AGREEMENTS AND INCREASING THEIR NUMBER 3. INCREASE IN THE PERCENTAGE OF RECIPROCAL VISITS BETWEEN THE UNIVERSITY AND FOREIGN ENTITIES. 4. PARTICIPATION IN JOINT SCIENTIFIC PROJECTS BETWEEN THE UNIVERSITY AND VARIOUS PARTIES.
2. RAISE THE UNIVERSITY'S GLOBAL RANKING	1. DEVELOP A PLAN TO RAISE THE INTERNATIONAL CLASSIFICATION OF THE UNIVERSITY, WHILE ANALYZING THE CURRENT SITUATION TO IDENTIFY STRENGTHS, WEAKNESSES, OPPORTUNITIES, AND THREATS. 2. TRAIN CADRES OF FACULTY MEMBERS AND SUPPORT STAFF TO ENGAGE WITH DATABASES AND PUBLISH RESEARCH IN INTERNATIONALLY RECOGNIZED JOURNALS.	1. THE UNIVERSITY ADVANCES IN INTERNATIONAL RANKINGS 2. INCREASE IN RESEARCH PUBLISHED IN INTERNATIONAL FIELDS. 3. INCREASE IN THE NUMBER OF RESEARCH PAPERS PUBLISHED IN ENGLISH FOR THE HUMANITIES.

OBJECTIVES	ACTIVITIES AND PROCEDURES	PERFORMANCE INDICATORS
	3. MOTIVATE INTERESTED FACULTY MEMBERS FINANCIALLY AND MORALLY TO PUBLISH. 4. IDENTIFY THE WEAKNESSES IN THE UNIVERSITY THAT LEAD TO DELAY IN CLASSIFICATION AND DEVELOP A PLAN TO ELIMINATE THEM. 5. HOLD TRAINING COURSES FOR FACULTY MEMBERS AND SUPPORT STAFF AND MOTIVATE THEM TO PARTICIPATE IN INTERNATIONAL PROJECTS, IN ADDITION TO CONDUCTING JOINT RESEARCH WITH INTERNATIONAL BODIES. 6. ENCOURAGE RESEARCHERS TO PUBLISH IN ENGLISH IF THEY PUBLISH RESEARCH IN ANOTHER LANGUAGE. 7. UPDATE AND PUBLISH THE UNIVERSITY PAGE IN ENGLISH TO PRESENT ACTIVITY AND INCREASE THE PROFILE OF THE UNIVERSITY	4. INCREASE IN JOINT RESEARCH INITIATIVES WITH FOREIGN ENTITIES. 5. INCREASE IN THE NUMBER OF INTERNATIONAL PROJECTS.
3. MOTIVATING FACULTY MEMBERS TO PARTICIPATE IN INTERNATIONAL PROJECTS	1. HOLD INTRODUCTORY MEETINGS ABOUT INTERNATIONAL PROJECTS, EUROPEAN UNION PROGRAMS AND AVAILABLE GRANTS. 2. SIGN LOCAL AND INTERNATIONAL AGREEMENTS WITH RECOGNIZED RESEARCH BODIES AND CENTERS THAT RESULT IN RESEARCH PROJECTS FUNDED FROM ABROAD. 3. RAISE AWARENESS OF THE CULTURE OF INTERNATIONALIZATION AND PARTNERSHIP WITH FOREIGN ENTITIES FOR FACULTY MEMBERS AND THE SUPPORTING STAFF. 4. ANNOUNCE ALL PROJECTS ON TIME AND HELPING RESEARCHERS TO APPLY FOR THEM	1. APPLICATION FOR INTERNATIONAL PROJECTS AND RESEARCH GRANTS 2. CONTRACTING AGREEMENTS THAT RESULT IN RESEARCH PROJECTS 3. JOINT RESEARCH WITH INTERNATIONAL RESEARCH BODIES 4. INCREASED DEMAND FOR INTERNATIONAL PROJECTS

OBJECTIVES	ACTIVITIES AND PROCEDURES	PERFORMANCE INDICATORS
4. MECHANISM OF ATTRACTING FOREIGN STUDENTS	1. MARKET THE FACULTIES AND UNIVERSITY PROGRAMS. 2. HOLD PERIODIC MEETINGS FOR FOREIGN STUDENTS TO INTRODUCE THEMSELVES TO THE UNIVERSITY AND TO FIND OUT ABOUT THEIR PROBLEMS. 3. PROVIDE HEALTH INSURANCE AND PREMIUM HOUSING. 4. INCREASE RECREATIONAL AND CULTURAL ACTIVITIES. 5. BECOME A MEMBER OF THE INTERNATIONAL STUDENT ALUMNI ASSOCIATION. 6. ENHANCE THE WORK OF THE ANNUAL CULTURAL DAY 7. DEVELOP JOINT PROGRAMS WITH FOREIGN UNIVERSITIES AND ACCREDIT THEM FROM THE QUALITY ASSURANCE AUTHORITY	1. INCREASE IN THE NUMBER OF FOREIGN STUDENTS. 2. REDUCTION OF PROBLEMS AND THE DEVELOPMENT OF SOLUTIONS FOR DIFFICULTIES





Arab Republic of Egypt

وزارة التعليم العالي والبحث العلمي

Ministry of Higher Education
& Scientific Research

7.
INNOVATION AND ENTREPRENEURSHIP

7.1 INTRODUCTION

Innovation and entrepreneurship have become vital pillars of growth and development in the modern world. As the global marketplace becomes increasingly competitive, the ability of higher education institutes to catalyze the creation of startups, SMEs, commercializable innovations, and social ventures becomes paramount. With the support of government initiatives and collaborations with industry and international institutions, HEIs are embracing a dynamic ecosystem that supports creativity, problem-solving, and the creation of new ventures. Over the past few years, Egypt has witnessed a surge in efforts to promote innovation and entrepreneurship as key drivers of economic and social progress. Universities have emerged as critical hubs for raising innovative ideas, fostering entrepreneurial mindsets, and empowering the next generation of changemakers. With a diverse range of disciplines and a vast pool of talented individuals, Egyptian universities have the potential to drive transformative change through their commitment to innovation and entrepreneurship.

The Egyptian government has played a crucial role in promoting innovation and entrepreneurship in higher education institutions. Various funding initiatives have been launched to provide financial support to startups and entrepreneurs, enabling them to transform their ideas into viable businesses. In addition, business plan competitions, hackathons, and other entrepreneurial events have become common, offering platforms for aspiring entrepreneurs to showcase their innovations, receive feedback, and attract potential investors. By positioning and robustly supporting innovation and entrepreneurship efforts within higher education institutes, we transform them into fourth generation higher education institutions and pave the way for the emergence of agile, forward-thinking individuals poised to drive economic growth, societal progress, and transformative change. This chapter delves into the critical importance of this positioning, exploring its multifaceted benefits and the strategic considerations that underpin its success.

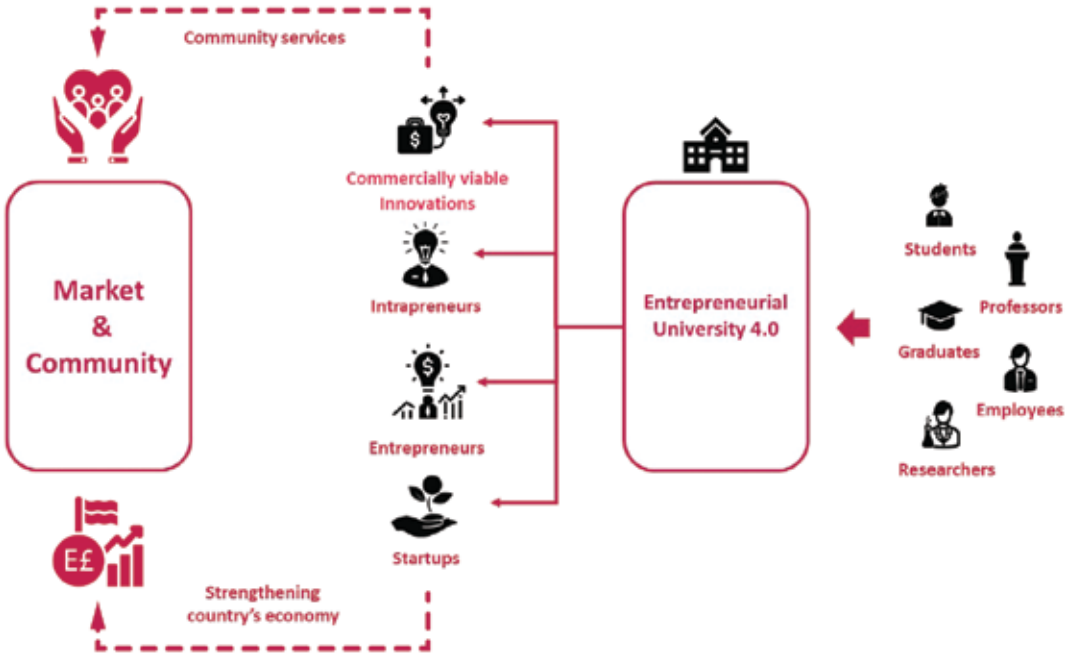


FIGURE (7 - 1) : THE ENTREPRENEURIAL ROLE OF 4TH-GENERATION UNIVERSITIES

7.2 CURRENT STATE

7.2.1 Current Statistics

This new strategy was created with the following initial statistics in mind:

- 92 Public, National, Technological and Private Universities
- 26 Research Institutes (11 belong to MOHESR + 15 belong to different ministries)
- 3.5 million students in Egyptian Universities and Higher Institutes

FIGURE (7 - 2) : CURRENT STATUS

7.2.2 Current Ranking

Egypt has been making strides in fostering innovation and entrepreneurship, and this effort is often reflected in the performance of its universities on various international rankings. The strategy considers several regional and global rankings that highlight commitment of Egypt to innovation and entrepreneurship:

- **Top #3 Startup Ecosystem in the MENA Region (Global Startup Ecosystem Report 2023):** This ranking underscores Egypt's successful startup culture and the conducive environment for innovation. Universities play a crucial role by nurturing entrepreneurial talent and promoting research that can lead to viable startups.
- **Top #4 Startup Ecosystem in Africa (Disrupt Africa Report 2021):** This ranking shows Egypt's position as a hub for innovation within the African continent. Universities contribute by equipping students with the skills and knowledge needed to drive entrepreneurship and create innovative solutions.
- **Top #52 Emerging Startup Ecosystem worldwide (Global Startup Ecosystem Report 2023):** Egypt's inclusion in this ranking highlights its potential for growth and its attractiveness to investors and startups. Universities contribute by providing education and resources that empower students to become successful entrepreneurs.
- **Top #76 in the Global Entrepreneurship Index (2019):** This ranking demonstrates the country's efforts to foster a supportive environment for entrepreneurs. Universities can enhance this by offering specialized programs, mentorship, and networking opportunities for aspiring entrepreneurs.
- **Top #86 in the Global Innovation Index (WIPO 2023):** Egypt's focus on innovation is evident in this ranking. Universities are key players in driving innovation through research initiatives, technology transfer, and partnerships with industries.
- **Top #95 in the Global Knowledge Index (2022):** This ranking reflects the country's commitment to knowledge acquisition and spreading. Universities contribute by producing research, promoting intellectual exchange, and fostering a culture of continuous learning.

Considering these rankings, the strategy seems to align well with Egypt's current achievements and aspirations in innovation and entrepreneurship. By considering these rankings, the strategy can capitalize on the existing momentum and work towards further fostering innovation and promoting entrepreneurship within the country's universities and beyond.

7.2.3 Supporting Legislations & Policies

The alignment of this strategy with various legislations, national strategies, and programs reflects Egypt's comprehensive approach to supporting innovation and entrepreneurship within its universities. These initiatives are designed to create an environment conducive to fostering research, innovation, and entrepreneurial activities. Here are some key legislations, strategies, and programs mentioned:

- **Intellectual Property Rights Protection Law 2002-82:** This law provides a legal framework for protecting intellectual property rights.
- **10 presidential decrees of executive bylaws of research centers and institutes (2021):** These amendments likely aim to enhance the efficiency and effectiveness of research centers and institutes, contributing to better research and innovation outcomes.
- **National Strategy of Science, Technology and Innovation 2016:** This strategy articulates two major pillars to foster STI, the first nurturing an enabling environment for STI, and the second production, transfer and localization of technology.

- **Egypt's Biodiversity Strategy and Action Plan 2015:** Recognizing the importance of biodiversity in fostering innovation, this strategy could support research efforts in this area.
- **Egypt's Sustainable Development Strategy - Egypt Vision 2030:** The focus on sustainability aligns with the broader goal of promoting innovation and entrepreneurship for a sustainable future.
- **Investment Law 2017-72:** An encouraging investment environment can attract funding and resources to support innovative ventures arising from universities.
- **Science, Technology, and Innovation Incentives Law 2018-23 and its executive bylaw:** This law likely provides motivations for research, development, and innovation activities, encouraging universities to engage in these areas.
- **National Program for Enhancing Local Manufacturing 2018:** Supporting local manufacturing can drive technological innovation and economic growth.
- **Egypt's Export Promotion Strategy 2018:** Strengthening exports can encourage innovative products and services, contributing to economic development.
- **Establishment of the Science, Technology, and Innovation Funding Authority Law 2019-150:** This institution likely provides financial support for research and innovation projects.
- **Establishment of the Innovators and Talents Fund Law 2019-01:** This fund could support innovative talents emerging from universities.
- **Communication and Information Technology Strategy 2030:** This strategy likely focuses on technology and communication to drive innovation, improve education, and enhance entrepreneurship in universities.
- **Law for the Development of Small, Medium, and Micro Enterprises 2020-15:** Supporting small and medium enterprises is essential for fostering entrepreneurship, and this law likely provides a regulatory framework to facilitate their growth.
- **National Artificial Intelligence Strategy 2021:** This strategy reflects Egypt's efforts to relate the potential of artificial intelligence to drive innovation and improve various sectors, including education and research.
- **National Program for Structural Economic Reform 2021:** Economic reform can have a positive impact on fostering innovation and entrepreneurship, providing a more encouraging environment for startups and innovative projects.
- **National Intellectual Property Strategy 2021:** This strategy ensures that creators and innovators are rewarded for their efforts.
- **Egypt's Digital Strategy for Cross-Border Services 2022:** The focus on digital services aligns with the changing landscape of business and innovation.
- **Amendment Law for Some Provisions of the University Organization Law 2022-01:** Amendments to university regulations directly impact the environment for research, innovation, and entrepreneurship within academic institutions.
- **Egypt's Digital Strategy for Outsourcing Industry 2023:** This strategy aims to position Egypt as a hub for technology outsourcing, which can open up opportunities for research collaboration and innovative projects.
- **Decision to Amend Some Provisions of the Executive Regulations of the Investment Law 2023-2140:** Changes to investment regulations can impact funding opportunities for startups and innovative projects within universities.
- **National Industrial Development Strategy 2023:** Industrial development can create a demand for innovative products and solutions, potentially aligning with university research and innovation efforts.

By aligning the new strategy with these various plans and laws, there's a solid foundation to cultivate a culture of innovation, research excellence, and entrepreneurship that will benefit both the academic community and the nation.

7.3 CHALLENGES

The entrepreneurship ecosystem in Egypt is rapidly evolving; however, many areas need support and expansion of services in terms of scope, density, and quality. Some of the gaps observed through our analysis include:

- <u>Within entrepreneurship awareness programs:</u>
  - The need for initiatives beyond Cairo and for those beyond privileged socioeconomic groups restricts equitable access to opportunities.
  - The insufficient number of entrepreneurship activities within educational institutions.
  - A well-recognized, nationwide startup competition to showcase Egypt's entrepreneurial prowess is needed.
  - The narrow definition of research excellence

in terms of knowledge utilization rather than knowledge production has to be changed.

- **Within the incubation and acceleration space:**
  - Many of the programs are growing and require significant technical and financial support to continue and grow, especially the ones within universities.
  - There is also a need for deeper sectoral specialization to build stronger knowledge and networks, and some attention to growth-stage startups.
  - Most of the incubators and accelerators are not-for-profit in nature, and remain dependent on external funding, which creates a sustainability risk.
  - There is also a clear need for a coordination and collaboration platform to create synergies among these new programs.
  - The pool of mentors needs to be expanded to provide broader support to the entrepreneurs.
  - Additional excellence centers in science and technology need to be established.

- **Within the access to finance space:**
  - There is a visible need for early-stage seed investments for technology and innovation startups, especially through expanding the angel networks.
  - There is also a need to support entrepreneurs during the fund-raising process.
  - For SMEs, support is needed to help them transition out of informality to access bank financing.
  - More programs to support alternative financing, such as factoring and leasing, are needed.
  - Business expenditure in R&D is lower than the expected average and insufficient.
  - There are insufficient incentives to encourage the implementation of national strategies.

- **Within entrepreneurship education and training:**
  - There is a need to expand the activities and training provided to school and university students through informal programs, and to expand digital educational content, such as MOOCs and similar platforms.
  - In addition to focus on Information and Communication Technologies, more focus is needed on other technological areas.
  - More programs are needed to utilize resources and engage SMEs and R&D activities in cooperation with academia.

7.4 VISION

By the year 2030, our aspiration is to secure a place among the Top 40 global Innovation and Startup Ecosystems. This positioning will signify our ecosystem's advancement into the Integration Stage, marked by a well-developed environment. With an ambitious target of hosting 4,000 startups, our ecosystem aims to achieve a state of self-sustainability and remarkable success. Our vision entails a future where innovation and entrepreneurship succeed, propelling us to global recognition and tangible impact.

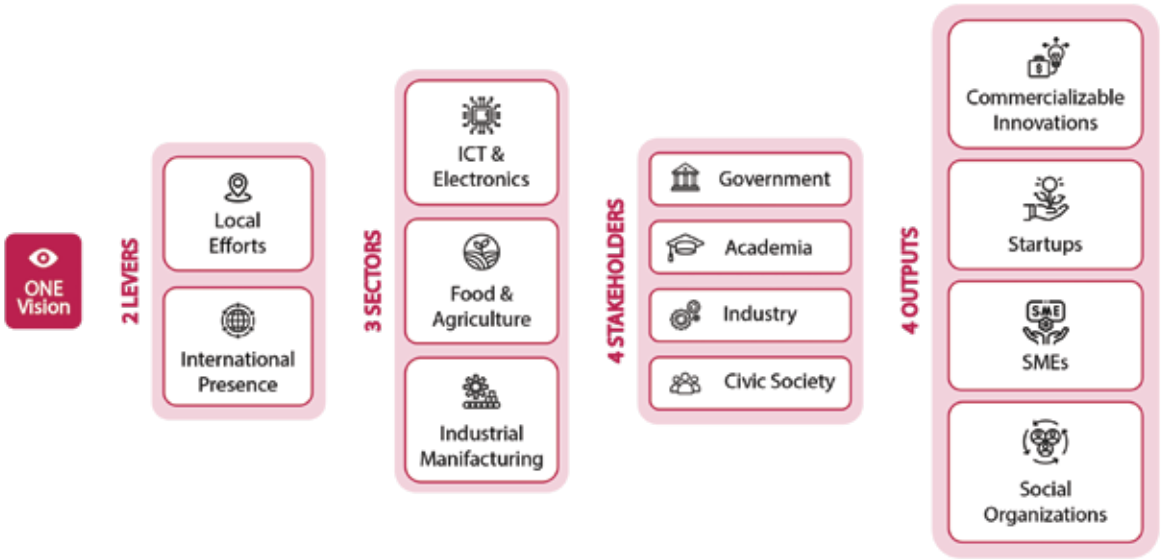


FIGURE (7 - 3) : VISION FOR INNOVATION AND ENTREPRENEURIAL STRATEGY WITHIN EGYPTIAN UNIVERSITIES

This vision for innovation and entrepreneurial strategy within Egyptian universities will be realized through a dual approach centered on two main levers which are the local strategic development and global presence. These two key approaches will be channeled towards advancing three central sectors: Information and Communication Technology & Entrepreneurship (ICTE), food and agriculture, as well as industrial manufacturing. The responsibility for realizing this vision rests with four primary stakeholders: **academia, government, industry, and civil society**. As a result of these concentrated efforts, four distinct accomplishments will emerge: the cultivation of market-ready innovations, the establishment of Small and Medium Enterprises (SMEs), the incubation of startups, and the formation of impactful social organizations.

7.5 LEVERS

7.5.1 Local Strategic Development

Within the framework of local strategic development, a dynamic strategy will unfold through the establishment of regional alliances of educational and research institutions within the seven regions. Each alliance will be tasked with conducting comprehensive market analyses to pinpoint prevalent needs and challenges. To proactively tackle these identified issues, specialized working groups within each alliance will be formed by students, researchers and faculty staff. These groups will be dedicated to advocating innovative solutions and products that directly address identified needs and challenges. To foster innovation and entrepreneurship, it is crucial to create an environment that supports and encourages creativity among students, researchers, and faculty staff. This involves universities, research centers, and specialized science and technology valleys.

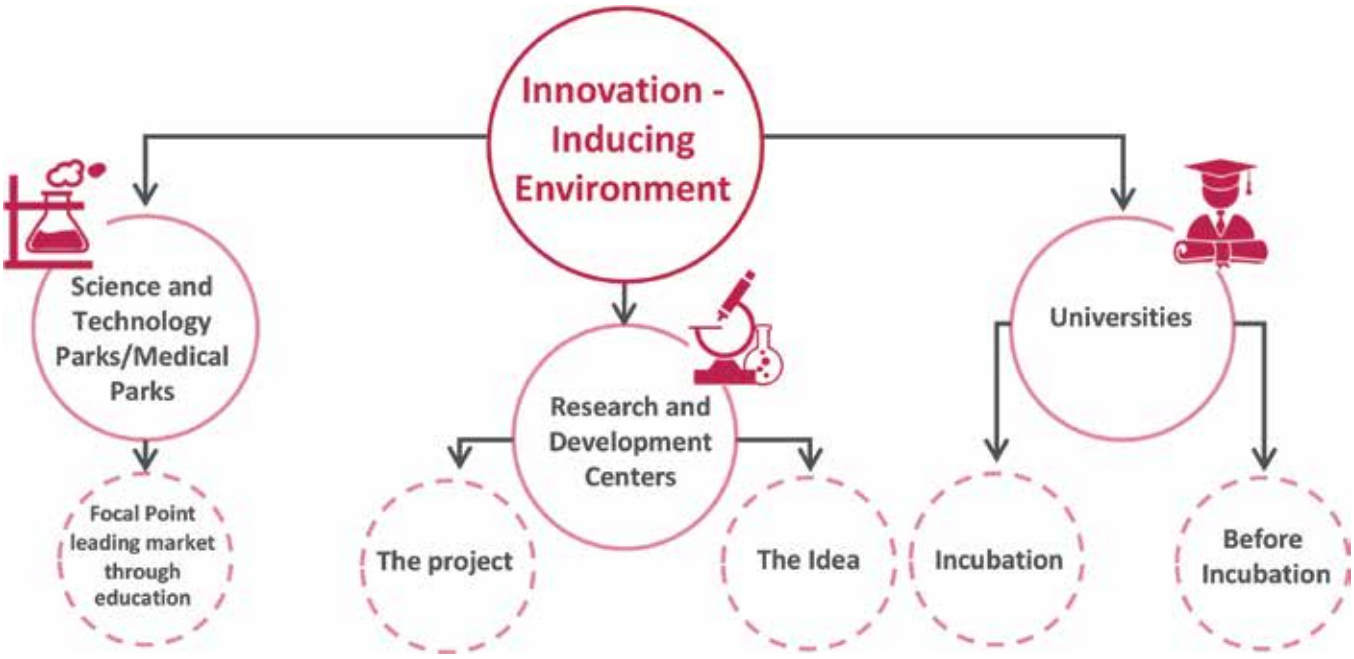


FIGURE (7 - 4) : INNOVATION-INDUCING ENVIRONMENT HOSTS

In line with fostering holistic development, strategic public-private partnerships will be initiated. These partnerships will play a pivotal role in the entire lifecycle of planning, funding, executing, and optimizing initiatives. By harnessing the collective strengths of both public and private sectors, these partnerships will facilitate the seamless realization of envisioned projects, resulting in amplified impact and sustainable growth.

7.5.2 Global Presence

International partnerships will play an essential role in boosting our innovative ecosystem forward. These collaborations will serve as essential avenues for numerous key objectives, ensuring an all-encompassing growth path.

- Firstly, these partnerships will enable a soft landing for our innovators, startups, and entrepreneurs

in foreign markets. By leveraging the resources, networks, and expertise of international partners, we can navigate unfamiliar territories more seamlessly, accelerating market entry and expansion.

- Furthermore, international partnerships will serve as channels for knowledge and experience transfer. By forging links with institutions renowned for their innovation expertise, we can gather insights, best practices, and methodologies that have boosted them to the forefront of global innovation.
- The potential for securing international grants and Foreign Direct Investments (FDIs) through these partnerships is also significant. Collaborative ventures on the international stage can provide access to funding streams that might not otherwise be available domestically. This influx of resources will empower us to execute ambitious projects, fostering innovation across various sectors and magnifying our overall economic impact.
- Partnerships with international entities will then allow for the creation of larger and more diverse working groups. These groups can tackle complex challenges that span multiple markets and industries. By pooling resources, expertise, and manpower from Egypt's 7 regions, working groups can develop innovative solutions more effectively. This collaborative approach leads to stronger working groups, and organizations that can create a thriving knowledge-based economy.

7.6 TARGETED MARKET SECTORS

Our innovation and entrepreneurial strategy will be strategically concentrated on three sectors: Information and Communication Technology & Entrepreneurship (ICTE), food and agriculture, and industrial manufacturing. These sectors have been chosen due to their immense potential to drive economic growth, create jobs, and foster sustainable development. Each of these sectors presents unique challenges and opportunities, and our strategy will involve collaboration with academia, government, industry, and civil society to drive innovation, create startups, foster SMEs, and establish impactful social organizations within these sectors.

FIGURE (7 - 5) : INNOVATION AND ENTREPRENEURIAL STRATEGY SECTORS

7.6.1 ICTE

Promoting research, innovation, and entrepreneurship in the fields of Information and Communication Technology (ICT) and Electronics is focal for Egypt's development track. These technologies have become the cornerstone of modern economies and are crucial for addressing local challenges and capitalizing on emerging market sectors, such as smart cities, autonomous vehicles, electric vehicles, precision agriculture, and Industry 4.0.

There are key achievements of the MOHESR, in collaboration with the Ministry of Communications and Information Technology in ICT and Electronics. The two ministries have closely worked together to utilize digital technologies and implement projects within the digital Egypt strategy. This collaboration encompasses enhancing university education and executing digital transformation initiatives which were previously mentioned in sections of "sustainable digital transformation" and "Electronic Health" in the sustainability principle.

The overall commitment involves ongoing cooperation and coordination with various agencies to transform universities into digital educational institutions, aligning with the national digital transformation strategy. The cooperation extends to automating university hospitals to create unified medical records for people, advancing the telemedicine presidential initiative, and utilizing technology to enhance healthcare services particularly in remote areas. The university hospital automation project digitizes hospitals and develops information infrastructure to integrate Egypt into the global health ecosystem.

Additionally, efforts are exerted in promoting tech education, including the development of academic programs aligned with future labor market needs, creating laboratories, and providing hands-on training to enhance students' skills. The establishment of tech universities is a huge step towards bridging the gap between the academic knowledge of graduates and skills needed for the market. These initiatives align with the national goal of linking education and industry to cultivate a skilled workforce equipped with the latest technological advances. Aligning with ICTE and Industry 4.0 principles entails the integration of automation, data exchange, and digital technologies. Thus, this integration should pave the way for Egypt to modernize its industrial sector. Dedicated research and innovation are needed in this domain for creating cutting-edge manufacturing techniques, reducing production costs, improving product quality, and boosting competitiveness in global markets.

Also, by encouraging entrepreneurship, Egypt can create a conducive environment for startups to flourish in the ICTE and Electronics sectors. These startups can identify strategic areas and develop innovative solutions tailored to local market gaps, thus reducing the need for imports, and enhancing the country's self-reliance.

7.6.2 Food & Agriculture

Encouraging research, innovation, and entrepreneurship in the Food & Agriculture sectors of Egypt is of paramount importance, especially with the growing significance of emerging areas like Biotechnology (BioTech), AI and data science in agriculture technologies. These innovations can boost crop yields contributing to sustainable and eco-friendly farming practices.

For a country like Egypt, where food security is a concern, adopting such technologies can play a pivotal role in ensuring a steady and nutritious food supply. Entrepreneurship within the Food and Agriculture sectors can lead to the commercialization of novel products and technologies. Startups and ventures can introduce innovative solutions for efficient water usage, soil health improvement, and disease management. These innovations can position Egypt as a leader in agri-tech on the global stage.

Accordingly, some goals are set to capitalize on Egypt's strengths in agriculture and prepare applied research in these fields:

- Updating university curricula and teaching approaches to align with industry needs.
- Strengthening the research capabilities of Egyptian universities, emphasizing on the applied research relevant to the agricultural sector.
- Facilitating collaborative research projects, while promoting enduring partnerships bringing together experts from academia, government, and the private sector in agriculture to exchange innovative ideas, share educational best practices, and collaborate on cutting-edge research.
- Establishing undergraduate and graduate degree programs, along with scholarships, that prioritize market demands.

- Promoting innovation in lab-to-market agricultural technologies
- Fostering collaborations between universities, research institutions, and the private sector to accelerate the development and implementation of breakthrough technologies, thus propelling the agricultural sector forward.

7.6.3 Industrial Manufacturing

Promoting innovation, and entrepreneurship in the industrial manufacturing sectors of Egypt is focal for driving economic growth and reducing import dependency. In this context, techniques like reverse engineering, product design, development, and prototyping play a key role in promoting innovation and local production.

Encouraging research and innovation collaborations between academia, research institutions, and industries facilitates the development of cutting-edge products. These collaborations allow for the exchange of knowledge, expertise, and resources, accelerating the innovation process and ensuring the creation of high-quality, market-ready products. Thus, by promoting entrepreneurship for industrial manufacturing, Egypt is actively encouraging startups and small businesses to transform innovative concepts into products. These enterprises can target specialized markets and introduce products that might be disregarded by larger corporate entities. This two-fold benefit not only drives economic advancement but also enriches the diversity of the manufacturing sector.

It is then aimed to widen constructive collaboration between the industrial institutions and scientific research centers to promote national manufacturing capabilities as well as to enhance and expand local manufacturing and technology. This collaboration helps in achieving industrial integration, boosting added value, and reducing imports to reinforce the implementation of the strategic plan for industrial development. Paying attention to Industrial manufacturing in this way can then increase export opportunities and expand areas of economic growth.

7.7 STAKEHOLDER GROUPS

The realization of this vision is dependent on the proactive engagement and collaboration of four primary stakeholders: academia, government, industry, and civil society. Each stakeholder's unique role and contributions are essential in organizing a collaborative ecosystem of innovation and entrepreneurship.

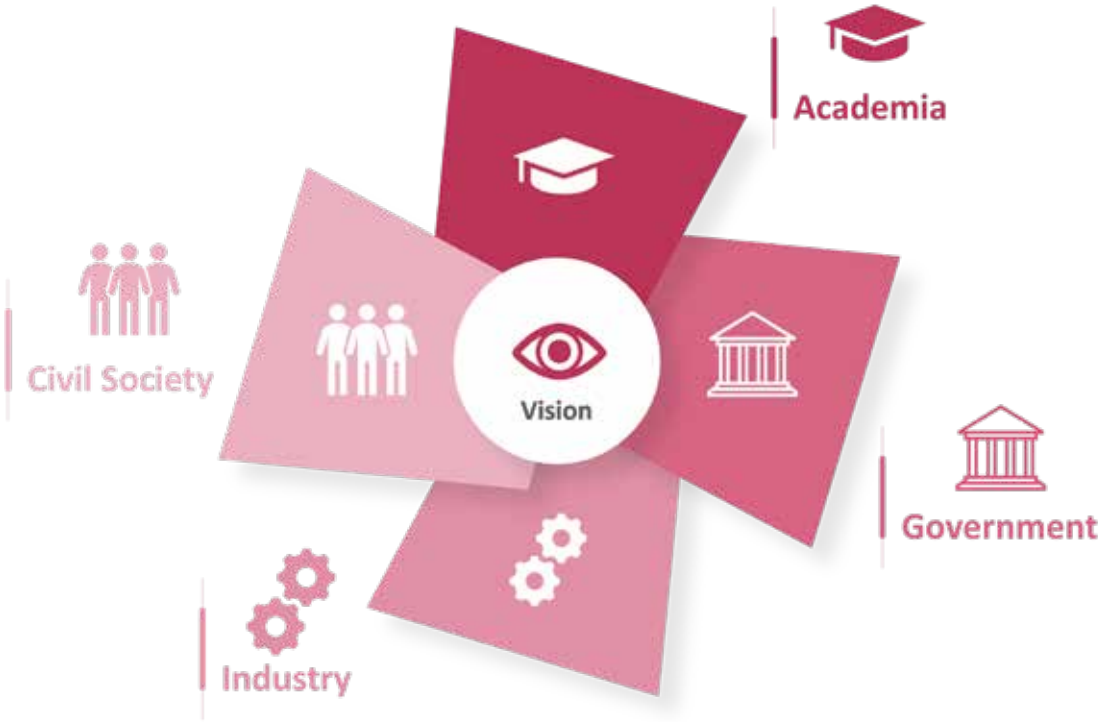


FIGURE (7 - 6) : STAKEHOLDER GROUPS

7.7.1 Academia

In today's fast-paced world, fostering innovation and entrepreneurship within higher education institutions is crucial to prepare students for the challenges of the modern economy. This proposal aims to introduce a network of Innovation Hubs within higher education institutions to promote innovation, entrepreneurship, and technology ventures, while providing a supporting environment for startups to thrive. Egypt needs to be transformed into an "Innovation Nation", also known as a "Knowledge Economy", to be able to satisfy its needs, continue to play its regional leadership role, and have more contribution to the global economy. To do so, fictitious barriers between market sectors and higher education need to be eliminated, allowing for more dialogue and collaboration. One of the key factors for entities to be more flexible, agile, and more innovative, is to have better communication and data exchange. This eventually allows service providers to have more empathy with service seekers, and accordingly be able to provide more appropriate innovative services. For this to happen, each entity or group of entities needs to have a focal point leading their communication and innovation system. Each of these focal points will be an innovation lab connected to others in the proposed National Innovation Network (NiN).

The MOHESR is considering establishing a National Innovation Network (NiN) that connects a different set of innovation labs and hubs across universities, community centers, society centers and industry clusters that would communicate, exchange data and services, collaborate, and share success stories. The NiN would also have an innovation academy embedded to provide the needed capacity building identified through the activities of the innovation labs within the network.

7.7.1.1 Objective

The primary goal of this proposal is to create a collaborative ecosystem of Innovation Hubs that will inspire, support, and guide students and faculty members in translating innovative ideas into viable technology ventures and startups. These hubs will serve as catalysts for economic growth, job creation, and the development of a vibrant entrepreneurial culture.

7.7.1.2 Benefits of Innovation Hubs

- **Promotion of Innovation:** Innovation Hubs will provide a platform for students and faculty to explore, experiment, and innovate across various disciplines.
- **Entrepreneurial Mindset:** By immersing students in an entrepreneurial environment, the hubs will instill critical skills such as problem-solving, creativity, and adaptability.
- **Startup Incubation:** The hubs will provide mentoring, resources, and funding to incubate technology ventures and startups, accelerating their growth and success.
- **Industry Collaboration:** Collaboration with industries and startups will enable students to gain real-world experience and access industry insights.
- **Job Creation:** Successful startups emerging from the Innovation Hubs will contribute to job creation and economic development.

7.7.1.3 Implementation Strategy

- **Hub Establishment:** Identify higher education institutions with strong potential for innovation and entrepreneurship and establish dedicated Innovation Hubs on their campuses.
- **Infrastructure and Resources:** Equip the hubs with state-of-the-art facilities, co-working spaces, prototyping labs, and access to mentors and experts.
- **Curriculum Integration:** Collaborate with academic departments to integrate innovation and entrepreneurship courses into the curriculum, encouraging interdisciplinary learning.
- **Startup Incubation:** Offer structured programs that provide startups with mentoring, funding, and business development support to help them transition from idea to market-ready product.
- **Networking Events:** Organize regular events, workshops, and pitch sessions to connect students, startups, mentors, investors, and industry partners.
- **Industry Partnerships:** Forge partnerships with local industries, startups, and investors to provide real-world projects, internships, and potential funding opportunities.
- **Impact Measurement:** Develop key performance indicators (KPIs) to track the success of the Innovation Hubs in terms of startups incubated, job creation, and collaborations.

7.7.1.4 Funding

Secure funding and a sustainable business model are essential for financial sustainability and developing a diverse ecosystem that supports the development of innovative ideas, products, and

startups. This can be done through a combination of government grants, private sector sponsorships, capital investments, and alumni contributions to support the establishment, operations, and growth of the innovation hubs.

7.7.1.5 Governance

The role of governance in academia in fostering innovation and entrepreneurship is crucial for creating an environment that effectively nurtures and supports these endeavors. It is required to establish a governing body comprising representatives from academia, industry, startups, and government to oversee the network of innovation hubs, ensure alignment with goals, and facilitate collaboration.

The governance body put the strategic direction of innovation and entrepreneurship initiatives within academia. It sets overarching goals, outlines priorities, and ensures that these efforts align with the institution's mission, vision, and long-term objectives. It develops policies that encourage innovation and entrepreneurship. It can create guidelines for the establishment and functioning of Innovation Hubs. It allocates funds for research, development, infrastructure, training, and support services, and ensures that resources are allocated efficiently to achieve the desired outcomes. It also creates platforms for networking, knowledge exchange, joint projects, and mentorship programs. Then, monitoring the progress and impact of efforts requires establishing mechanisms for periodic evaluation to assess the effectiveness of programs, identify areas of improvement, and make informed decisions based on data-driven insights. As innovation and entrepreneurship often involve risk-taking, it is important to identify potential risks, develop risk mitigation strategies, and create contingency plans to address challenges that may arise.

The governance of academia plays a vital role in shaping the innovation and entrepreneurship landscape within educational institutions. By establishing strategic direction, policies, resource allocation, and collaborations, the governance body can create an ecosystem that not only supports the growth of startups and innovations but also contributes to the overall advancement of knowledge, economic development, and societal impact.

7.7.1.6 Conclusion

The establishment of a network of Innovation Hubs within higher education institutions is a visionary initiative that will drive innovation, entrepreneurship, and economic growth. By nurturing the next generation of innovators and supporting technology ventures, we can create a thriving ecosystem that contributes to both the academic and economic landscape. We invite stakeholders from academia, industry, startups, and government to join hands in making this transformative vision a reality, positioning our institutions as centers of innovation, and fostering a culture of entrepreneurship.

7.7.2 Government

In an era marked by rapid technological advancements and changing societal needs, the Egyptian government recognizes the necessity to foster innovation within its institutions. To enhance public service delivery, increase efficiency, and address contemporary challenges, the creation of a network of Governmental Innovation Labs (GILs) across various governmental institutions in Egypt is proposed.

7.7.2.1 Objective

The primary goal of this proposal is to establish a collaborative and dynamic ecosystem of GILs that will promote innovation, creativity, and modernization within the government. These Government Labs are to be an alternative vehicle for policy making, by turning collaborative trans-disciplinary spaces of sociopolitical experimentation, into a revolutionary sustainable process, that would change the way we address and understand traditional policies and decision-making processes. These labs would involve a diverse set of key stakeholders, from policy makers, and civil leaders to practitioners, academics, non-profit organizations, and social innovators, to co- design and co- participate in the design of public policies, with the purpose of improving social welfare and institutionalizing a new way of doing things.

7.7.2.2 Benefits of Governmental Innovation Labs

- **Enhanced Public Services:** GILs will enable the government to develop user-centric services that are responsive to the needs of citizens. By adopting innovative approaches, service quality can be improved.
- **Efficiency and Cost Reduction:** Innovations stemming from GILs can lead to more efficient

resource allocation, reducing costs and optimizing government operations.

- **Data-Driven Decision Making:** GILs will encourage the use of data analytics to inform policy decisions, resulting in more effective and evidence-based governance.
- **Talent Retention and Attraction:** The establishment of GILs will create a platform for Egypt's brightest minds to contribute to public service innovation, fostering a culture of talent retention and attraction within the government.
- **Global Competitiveness:** A network of GILs will position Egypt as a hub for government innovation, enhancing the country's global competitiveness and attractiveness for foreign investment.

7.7.2.3 Implementation Strategy

- **Identification of Key Sectors:** Identify critical sectors within governmental institutions that would benefit from innovation, such as healthcare, education, transportation, and public administration.
- **Lab Creation:** Establish GILs in each identified sector, equipped with resources including advanced technologies, interdisciplinary teams, and collaboration spaces.
- **Capacity Building:** Provide training and workshops to equip government employees with innovation skills, fostering a culture of continuous learning.
- **Partnerships:** Foster collaborations with academic institutions, private sector companies, and international organizations to share knowledge, resources, and expertise.
- **Innovation Challenges:** Launch regular innovation challenges to encourage participation, creativity, and problem-solving within the labs.
- **Set clear metrics:** assess the impact of GILs, such as the number of successfully implemented innovations, efficiency gains, and user satisfaction.

7.7.2.4 Funding

To establish, operate, and continuously enhance the Governmental Innovation Labs (GILs), a comprehensive funding strategy is essential. This strategy should encompass diverse sources to ensure stability, adaptability, and sustainability for these innovation hubs. Securing funding can be from a combination of government budgets, international development grants, fee-based services, and private sector partnerships to support the establishment, operation, and continuous improvement of the GILs.

7.7.2.5 Governance

The governance structure for the network of GILs plays a pivotal role in ensuring their effectiveness, impact, and alignment with national innovation goals. It is required to establish a dedicated central body responsible for overseeing the network of GILs, monitoring their progress, facilitating knowledge sharing, and ensuring alignment with national innovation goals.

7.7.2.6 Conclusion

The establishment of a network of Governmental Innovation Labs in Egyptian governmental institutions will pave the way for a more agile, efficient, and citizen-centric government. By fostering a culture of innovation and collaboration, Egypt will be better equipped to address complex challenges and capitalize on emerging opportunities in the digital age. We welcome the support and partnership of stakeholders from various sectors to make this visionary initiative a reality, leading to a more prosperous and innovative future for Egypt and its people.

7.7.3 Industry

In today's rapidly evolving market landscape, the synergy between academia and industry has become increasingly crucial for fostering innovation, driving economic growth, and ensuring a well-prepared workforce. This proposal outlines the creation of a network of Centers of Excellence (CoEs) aimed at strategically bridging the gap between industry and academia, fostering collaboration, and nurturing innovation within targeted market sectors.

7.7.3.1 Objective

The primary goal of this proposal is to establish a collaborative ecosystem of CoEs that will serve as hubs of excellence, facilitating knowledge exchange, research collaboration, and skill development between academia and industry. These CoEs will address real-world challenges, promote technology transfer, and equip the workforce with the skills needed to thrive in today's competitive markets.

A center of excellence (CoE) is a designated hub of knowledge and innovation within the university. Being a specialized unit in a specific area of expertise, CoEs are known for exceptional quality in research, teaching, and contributions in a particular field or discipline. Accordingly, they can provide services for all regions and act as the connection between the market (the beneficiaries) and the educational consortiums (the actors).

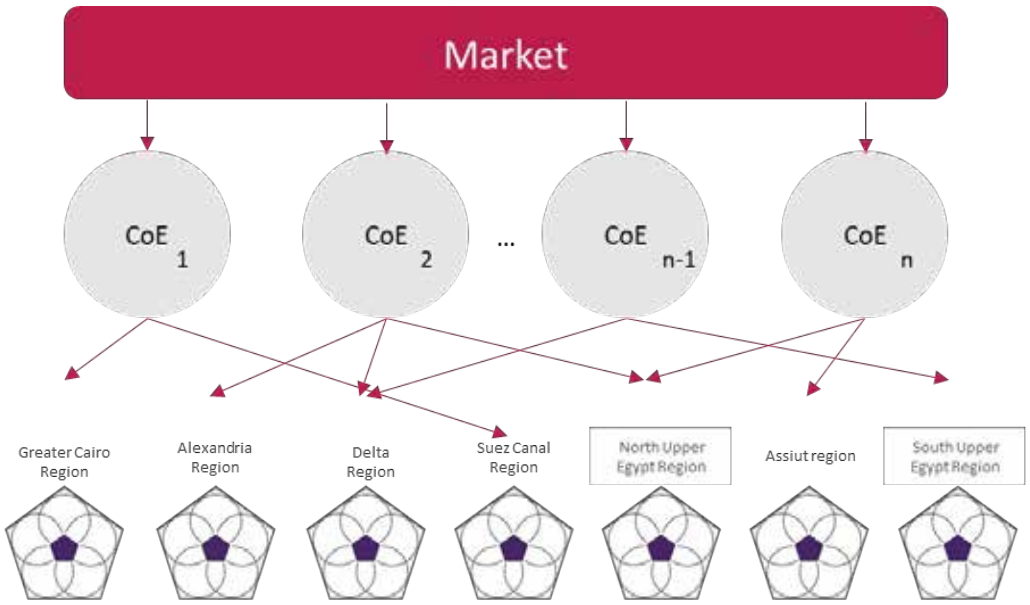


FIGURE (7 - 7) : CENTERS OF EXCELLENCE AS A LINK BETWEEN REGIONAL CONSORTIUMS AND THE MARKET

7.7.3.2 Benefits of Centers of Excellence

- **Industry-Relevant Research:** CoEs will conduct industry-driven research that addresses specific challenges and opportunities, resulting in actionable insights and solutions for businesses.
- **Skills Enhancement:** CoEs will offer specialized training programs that align with industry needs, enhancing the skills of students, researchers, and professionals.
- **Technology Transfer:** CoEs will facilitate the transfer of cutting-edge technologies and research findings from academia to industry, fostering innovation and economic growth.
- **Collaborative Innovation:** By bringing together researchers, industry experts, and policymakers, CoEs will encourage cross-disciplinary collaboration and innovation.
- **Talent Pipeline:** The collaboration between academia and industry through CoEs will produce graduates with practical skills and relevant knowledge, ready to contribute to the workforce.

7.7.3.3 Implementation Strategy

- **Market Sector Selection:** Identify strategic market sectors that require collaboration between academia and industry, such as advanced manufacturing, renewable energy, healthcare technology, etc.
- **CoE Establishment:** Establish CoEs in partnership with universities, research institutes, and industry stakeholders. Each CoE will focus on a specific sector and have state-of-the-art facilities.
- **Industry-Academia Collaboration:** Facilitate partnerships and joint research projects between CoEs and industry players, fostering a two-way exchange of expertise.
- **Curriculum Enhancement:** Work with academia to develop industry-relevant curricula that equip students with practical skills and knowledge.
- **Skills Training:** Offer training programs, workshops, and internships that provide hands-on experience and exposure to industry practices.
- **Technology Transfer Initiatives:** Create mechanisms for transferring research outcomes and technological innovations from CoEs to industry partners.
- **Measurable Impact:** Establish key performance indicators (KPIs) to measure the success of CoEs in terms of research output, industry engagement, skill enhancement, and economic impact.

7.7.3.4 Funding

Securing funding from government grants, industry partnerships, donations, and international organizations is required to support the establishment, operation, and growth of the CoEs.

7.7.3.5 Governance

Besides, forming a governing body is required to be composed of representatives from academia, industry, and relevant government agencies to oversee the CoE network, ensure alignment with goals, and facilitate collaboration. All of which contribute to the long-term sustainability and impactful outcomes of the CoE.

7.7.3.6 Conclusion

The creation of a network of CoEs targeting strategic market sectors is a visionary step toward fostering collaboration between academia and industry. By establishing these CoEs, we can unlock the potential for innovation, research, and economic growth, ultimately leading to a more dynamic and competitive market environment. We invite stakeholders from academia, industry, and government to join forces in making this transformative initiative a reality for the betterment of our economy and society.

7.7.4 Civil Society

In a world marked by rapid social, economic, and technological changes, the need for innovative solutions to address pressing societal challenges has become more critical than ever. This proposal aims to introduce a network of Societal Innovation Labs (SILs) within NGOs, syndicates, and civil society institutions to drive positive change, empower communities, and foster collaboration for impactful outcomes.

7.7.4.1 Objective

The primary goal of this proposal is to establish a collaborative ecosystem of SILs that will facilitate the development and implementation of innovative solutions to address various social issues. By leveraging local expertise, participatory approaches, and interdisciplinary collaboration, these labs will contribute to the betterment of society at large.

7.7.4.2 Benefits of Societal Innovation Labs

- **Community Empowerment:** SILs will enable local communities and civil society stakeholders to actively engage in the identification, design, and implementation of solutions that are tailored to their unique needs and challenges.
- **Cross-Sector Collaboration:** By bringing together NGOs, syndicates, civil society institutions, and other stakeholders, SILs will create a platform for cross-sector collaboration, promoting the sharing of knowledge, resources, and best practices.
- **Inclusive Approach:** SILs will prioritize inclusivity, ensuring that marginalized and underrepresented voices are heard and integrated into the innovation process, leading to more equitable outcomes.
- **Local Ownership:** Solutions developed within SILs will be rooted in local contexts and driven by local stakeholders, leading to more sustainable and contextually relevant impact.
- **Advocacy and Policy Influence:** The innovative solutions generated by SILs can serve as advocacy tools to influence policies and drive systemic change, amplifying the impact on a larger scale.

7.7.4.3 Implementation Strategy

- **Mapping Needs:** Identify key societal challenges and areas where innovation can make a meaningful difference, consulting with community members, NGOs, syndicates, and civil society organizations.
- **Lab Creation:** Establish SILs within partnering NGOs, syndicates, and civil society institutions, ensuring they have the necessary resources, training, and expertise.
- **Capacity Building:** Provide training and workshops to build innovation, problem-solving, and collaboration skills among lab participants and facilitators.
- **Partnerships:** Forge partnerships with academic institutions, private sector organizations, and government bodies to enhance knowledge sharing, resource allocation, and impact measurement.
- **Innovation Journeys:** Facilitate innovation journeys that guide participants through the process of problem identification, ideation, prototyping, testing, and scaling of solutions.
- **Monitoring and Evaluation:** Develop a robust system for monitoring and evaluating the impact of SIL-generated solutions on targeted societal challenges.

7.7.4.4 Funding

Securing funding through a combination of grants, donations, corporate partnerships, and government support is essential to sustain the operations, capacity building, and expansion of the SIL network.

7.7.4.5 Governance

Establishing a coordinating body responsible for overseeing the network of SILs is a key element for ensuring alignment with societal innovation goals, facilitating collaboration, and providing support to individual SILs.

7.7.4.6 Conclusion

The establishment of a network of Societal Innovation Labs within NGOs, syndicates, and civil society institutions will empower local communities,

foster collaboration, and drive sustainable positive change. By providing a platform for innovative problem-solving and cross-sector engagement, these labs will contribute to a more inclusive, equitable, and forward-thinking society. We invite stakeholders from diverse sectors to join hands in making this transformative vision a reality for the betterment of our society.

7.8 TARGETED OUTPUT

The strategic focus on innovation and entrepreneurship within HEIs has the potential to yield a transformative range of outcomes. By fostering a dynamic ecosystem that encourages creativity and problem-solving, these institutions can actively contribute to the development of commercializable innovations, the emergence of vibrant SMEs and startups, and the growth of impactful social organizations. This multilayered approach not only pushes economic growth by enabling the transition of cutting-edge ideas into marketable products and services but also drives job creation, enhances societal well-being, and addresses pressing community challenges. As Egyptian universities become hubs of entrepreneurial activity, they empower students, researchers, and aspiring entrepreneurs to connect their talents and insights, resulting in a harmonious merge of academic activity and real-world application.

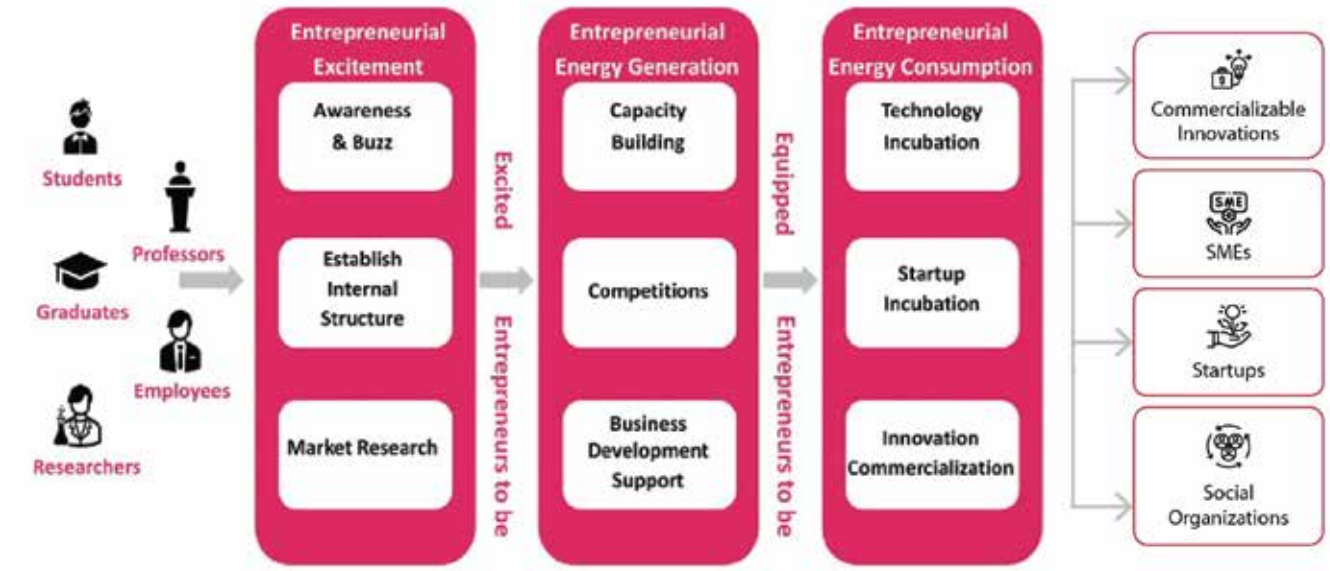


FIGURE (7 - 8) : MOHESR INNOVATION AND ENTREPRENEURSHIP STRATEGIES

7.8.1 Commercializable Innovations

A commercializable innovation refers to a novel idea, technology, or solution that has the potential to be developed into a marketable product or service. It involves translating concepts into tangible products that have value, related to market needs, and generate revenue. Commercializable innovations can be related to any sector ranging from technology and healthcare to agriculture and energy. For Egypt, investing in innovation and its commercialization is of great significance. The country's diverse economy and dynamic market conditions provide opportunities for creating new technologies that can meet emerging challenges and address the evolving market demands. Thus, investing in innovation and its commercialization is crucial for economic growth, job creation, competitiveness, export opportunities, facing local challenges, enhancing resilience against economic fluctuations, and attracting investment. In addition, encouraging the commercialization of innovation can foster a vibrant startup culture, where entrepreneurs turn ideas into viable businesses.

7.8.2 SMEs

Small and Medium-sized Enterprises (SMEs) are businesses that fall within a size range that is often determined by the number of employees, annual turnover, or total assets. These enterprises have a

major role in driving innovation, creating new jobs, and accordingly contributing to overall economic growth. SMEs are characterized by their agility, adaptability, and potential to address specific market needs in innovative ways. Egypt possesses a diverse economy with various sectors, and SMEs can act as catalysts for economic development and diversification. Investing in SMEs and entrepreneurship will contribute in driving technological advancement and promoting a culture of innovation. SMEs contribute to diversifying the products and services available in the market. SMEs have the flexibility to target different markets and can expand beyond domestic markets.

Egypt can unlock the potential of its entrepreneurs, encourage economic diversification, and create a vibrant and dynamic business landscape that contributes to sustainable economic development.

7.8.3 Startups

Startups are small dynamic enterprises that are characterized by their innovative ideas and potential for rapid growth. They are often founded by individuals or small teams who aim to create and bring new products, services, or technologies to the market. Startups are characterized by pushing the boundaries of traditional industries and adopting innovative ideas to meet evolving market needs. Egypt possesses a large and youthful population so by supporting aspiring entrepreneurs, Egypt can tap into its potential to drive economic growth, job creation, global competitiveness and technological advancement. By creating an enabling ecosystem that provides mentorship, funding, regulatory support, and access to resources, Egypt can position itself as a hub for innovation and startups in the region.

7.8.4 Social Organizations

Social organizations, also known as nonprofits or non-governmental organizations (NGOs), are dedicated entities that aim to address pressing societal challenges. These organizations are driven by a sense of social responsibility and commitment to making a change to the people's lives, communities, and society. They often focus on areas such as education, healthcare, poverty alleviation, environmental sustainability, and human rights.

Creating new and innovative social organizations holds immense importance for the country to face a range of complex challenges, including economic inequalities, unemployment, inadequate access to education and healthcare, and environmental concerns. Egypt can harness the power of innovation, creativity, and business vision to address these issues effectively. Individuals and groups can develop sustainable business models that simultaneously generate social impact and financial sustainability.

7.9 ECOSYSTEM DRIVERS

7.9.1 Policies & Regulations

To effectively promote innovation and entrepreneurship within Higher Education Institutions (HEIs), it is imperative to assess the existing legislative and policy framework that supports innovation and entrepreneurship within these institutions. Understanding which policies are being implemented, which are not, and identifying potential obstacles is a vital step towards creating an environment that supports innovation and entrepreneurship. This will go through two main phases:

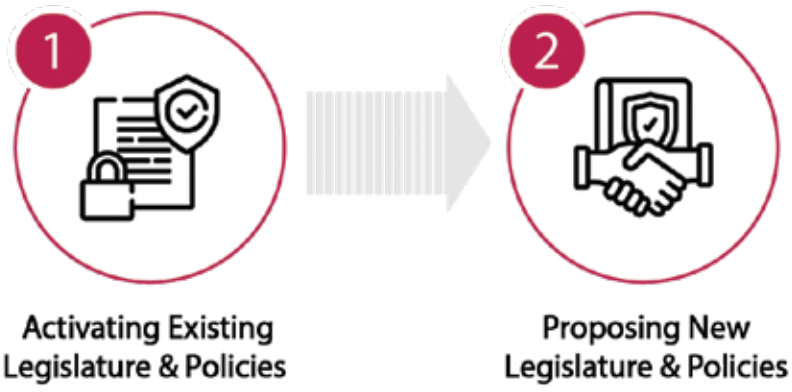


FIGURE (7 - 9) : THE SUPPORTING PHASES FOR INNOVATION AND ENTREPRENEURSHIP

7.9.1.1 Activating Existing Legislature & Policies

- **Identifying Implemented and Unimplemented Policies:**
  Analyzing the current legislative and policy landscape allows us to identify the extent to which initiatives promoting innovation and entrepreneurship within HEIs are being executed. This process helps in understanding the challenges that hinder full implementation and sheds light on successful models that can be replicated.

- **Addressing Implementation Challenges:**
  Recognizing policies that face barriers to implementation is essential for devising strategies to overcome these challenges. These barriers could include lack of resources, inadequate awareness, bureaucratic hurdles, or conflicting interests. By pinpointing the obstacles, efforts can be directed towards finding solutions and allocating resources effectively.

- **Identifying Gaps:**
  Identifying gaps between the existing policies and the actual needs of HEIs and aspiring entrepreneurs is a critical step. These gaps could range from inadequate support for student startups to a lack of incentives for faculty involvement in entrepreneurial activities. Identifying these discrepancies allows for targeted interventions to bridge the divide and create a more conducive environment.

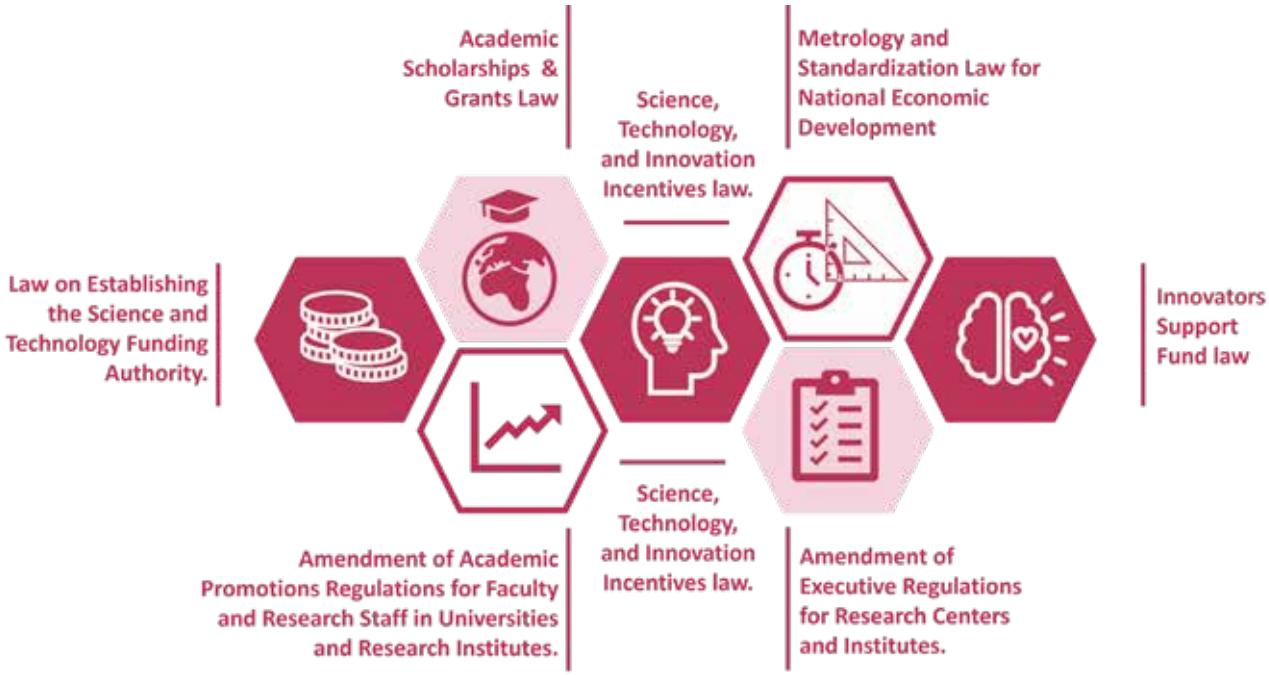


FIGURE (7 - 10) : EXAMPLES OF THE NEW LEGISLATIONS THAT SUPPORT INNOVATION & ENTREPRENEURSHIP

7.9.1.2 Proposing New Legislation & Policies

- **Proposing New Legislation and Policies:**
  The process of identifying gaps paves the way for proposing new legislation and policies that address these deficiencies. Collaborative efforts between government bodies, educational institutions, industry stakeholders, and entrepreneurship experts can help in crafting comprehensive policies that encompass funding mechanisms, curriculum enhancements, mentorship programs, and streamlined administrative processes.

- **Importance of Public-Private Partnerships:**
  Engaging both public and private sectors is essential for effective policy formulation and implementation. Public-private partnerships can ensure a holistic approach to fostering innovation and entrepreneurship, leveraging the expertise and resources of both sectors to create a robust ecosystem.

- **Ensuring Flexibility and Agility:**
  As innovation is often unpredictable, policies must be designed to adapt to changing circumstances. Ensuring that the legislative framework remains flexible and agile allows for timely responses to emerging challenges and opportunities.

In conclusion, the process of identifying, analyzing, and proposing legislative and policy changes to promote innovation and entrepreneurship within Higher Education Institutions is a multifaceted endeavor. It involves collaboration between government bodies, educational institutions, industry leaders, and experts in the field. By addressing implementation challenges, bridging gaps, and creating an enabling environment for innovation, a country can cultivate a thriving ecosystem that fosters creativity, supports startups, and contributes to economic growth and societal progress.

7.9.2. Internal Institutional Structures & Processes

A new position needs to be introduced in the new administrative structure. This position will be for the vice president for entrepreneurship and business, who will be responsible for discovering and adopting talents in the field of leadership and coordination to link them to industrial sectors and the science and technology valleys, as well as cooperating with other academic and industrial institutions, which will help enrich educational services, scientific research, and innovation in common areas. In the research center rules were updated, and a new role was introduced—the deputy director of the entrepreneurship and community service research center. This role focuses on encouraging innovation and business development using technology in labs, and it aims to connect scientists with community stakeholders.

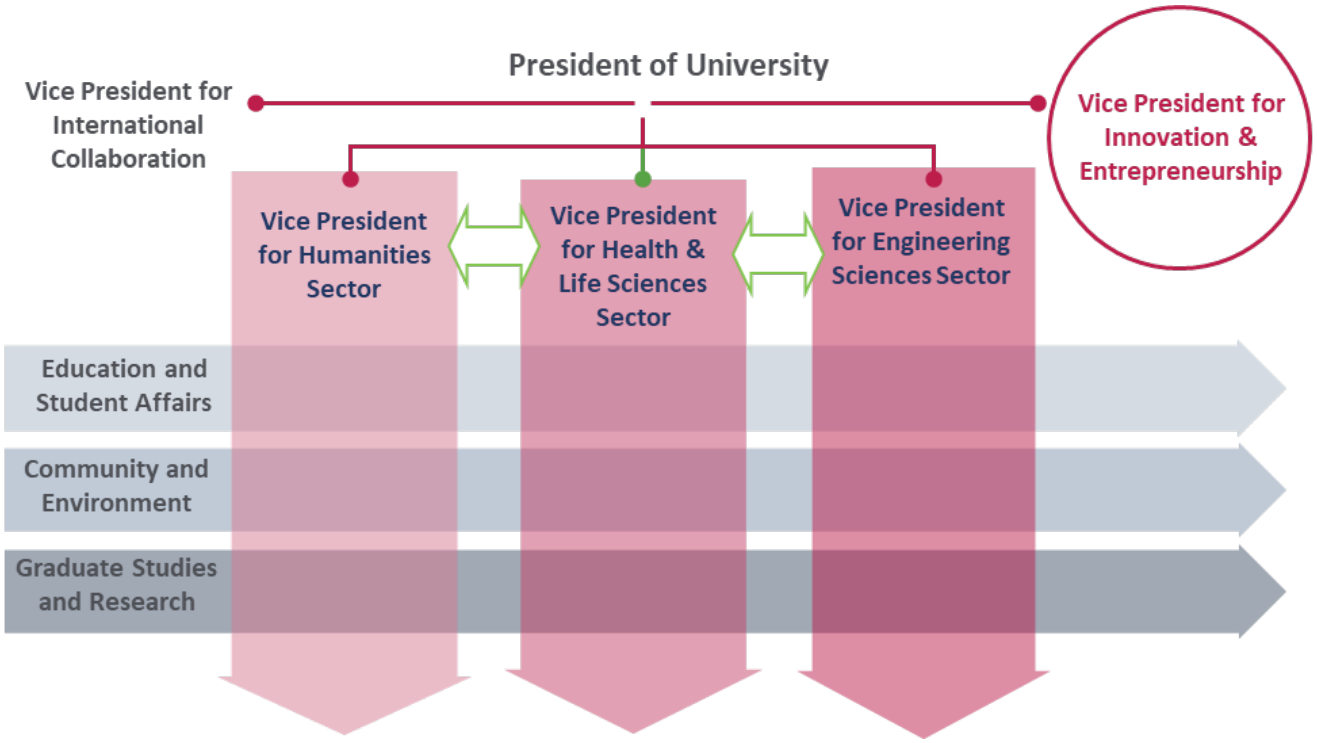


FIGURE (7 - 11) : ORGANIZATIONAL STRUCTURE OF UNIVERSITIES

The vice president for innovation and entrepreneurship also leads the board of directors for the iHubs which comprise a service unit and a company owned by the university or research institute as per the organizational chart in the figure below.

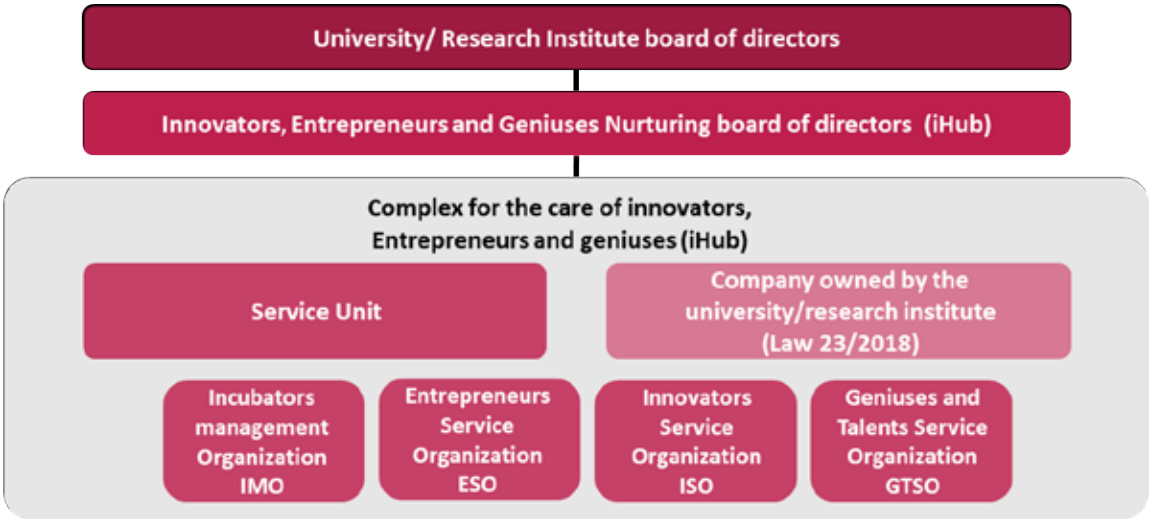


FIGURE (7 - 12) : ORGANIZATIONAL STRUCTURE OF INNOVATION AND ENTREPRENEURSHIP

7.9.3 Talents

Universities should provide an open space for creativity and innovation, thereby attracting competencies and embracing ideas and acting as the main incubators for research and ideas. Activating the concept of innovation and entrepreneurship can be achieved through the creation of triangular connections between education, business, and research (concepts of 4th generation universities) as follows:

1. 1. New methods of linking academics, business, and research
2. New fields for teaching focused on innovation, creativity, and entrepreneurship.
3. Creating new fields to close the circle for students and ensure the transfer of knowledge from the business side to the academic side.

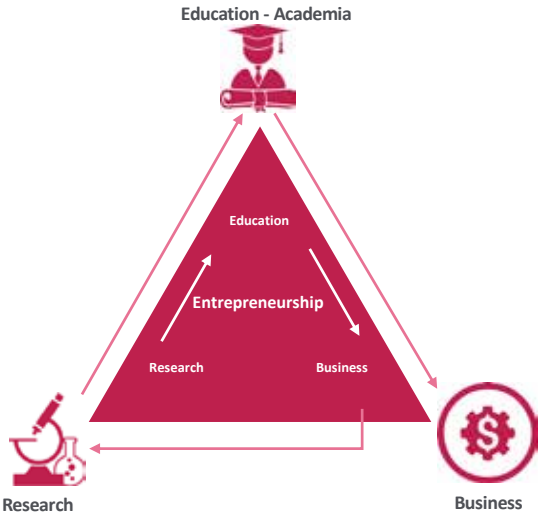


FIGURE (7 - 13) : TRIANGULAR CONNECTION TO HELP ACTIVATE THE INNOVATION AND ENTREPRENEURSHIP CONCEPT

Egyptian universities have recognized the importance of integrating entrepreneurship education into their curricula. Courses and programs focused on entrepreneurship have been introduced to equip students with the necessary skills, knowledge, and mindsets required to navigate the challenges of starting and managing their own ventures. By promoting an entrepreneurial ecosystem within the academic framework, universities are empowering students, staff members, and researchers to become active agents in the realm of entrepreneurship and innovation. Promoting innovation and entrepreneurship among students in Egyptian universities involves several key aspects that contribute to fostering an entrepreneurial mindset, nurturing creative thinking, and equipping students with the skills and knowledge needed to succeed in the startup ecosystem. Here are some essential aspects of promoting innovation and entrepreneurship among students in Egyptian universities:

7.9.3.1. General Employability & Career Development

To support these talented students, universities establish dedicated entrepreneurship programs that provide courses, workshops, and practical experiences in key entrepreneurial skills. Creating incubation spaces and co-working areas within campuses allows students to work on their startup ideas and access necessary resources.

Several institutions have launched programs offering early-stage startups access to training, mentorship, networking opportunities, and even potential funding.

University Initiatives include:

- **The Technology Innovation and Entrepreneurship Center at the American University in Cairo (AUC V-Lab)** - AUC V-Lab provides a vibrant ecosystem for innovation and entrepreneurship. It offers incubation programs, mentorship, networking events, and access to funding sources to support AUC students, faculty, and alumni in launching and scaling their ventures. The center focuses on technology-based startups and encourages interdisciplinary collaboration.

FIGURE (7 - 14) : AUC V-LAB

- **The Nile University Innovation, Entrepreneurship and Competitiveness Center (NU IECC)** - NU IECC at Nile University aims to nurture innovation and entrepreneurship among students and researchers. It provides a supportive environment for startups through mentorship, training programs, access to funding, and networking opportunities. The center actively engages with industry partners, encouraging technology transfer and collaboration.

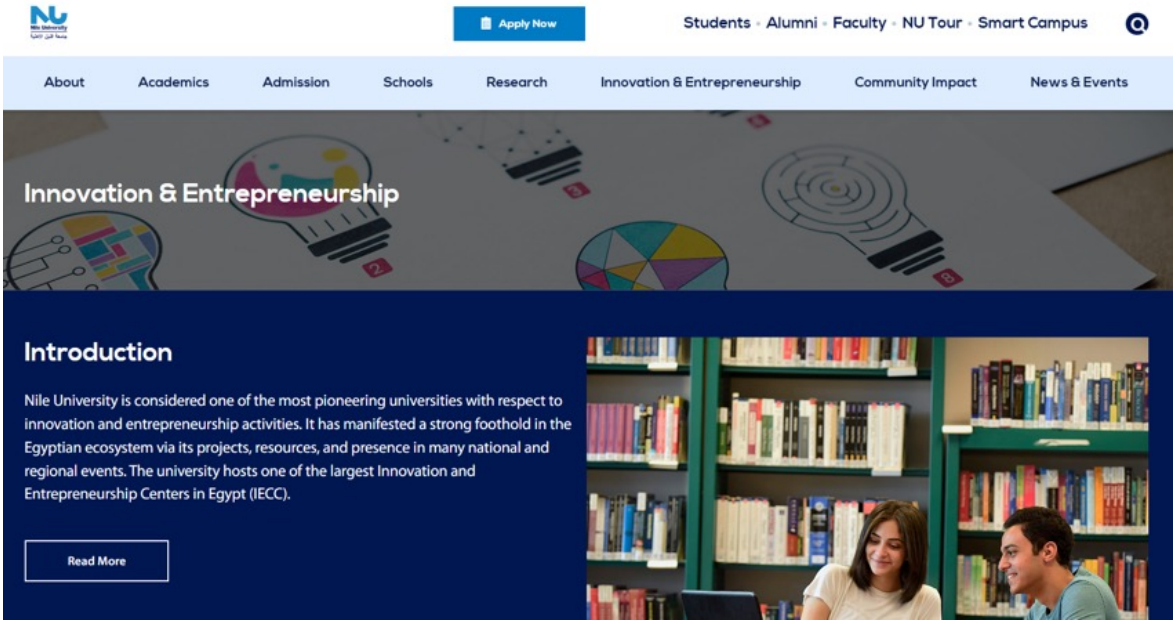


FIGURE (7 - 15) : NILE UNIVERSITY IECC

- **The Technology Innovation and Entrepreneurship Center at Ain Shams University (TIEC-ASU)** -TIEC-ASU promotes innovation and entrepreneurship by providing incubation support, mentorship, and business development services to aspiring entrepreneurs. The center focuses on technology-driven startups and collaborates with industry partners to foster commercialization and knowledge transfer.

FIGURE (7 - 16) : TIEC- AIN SHAMS UNIVERSITY

7.9.3.2. Curricular Educational Entrepreneurship & Innovation Courses

Curricular educational entrepreneurship and innovation courses should be designed to provide students with the knowledge, skills, and mindset necessary to create, develop, and manage educational initiatives, products, and services. These courses typically focus on blending principles of entrepreneurship and innovation with the unique challenges and opportunities in the education sector.

7.9.3.3. Extracurricular Entrepreneurship & Innovation Training

Talent training programs should provide the following support:

- **Offering experiential learning opportunities for students:** this is to apply their theoretical knowledge in practical settings. Internships, co-op programs, and startup incubators provide students with hands-on experiences, allowing them to work alongside entrepreneurs, learn from their experiences, and gain insight into the challenges and opportunities of the startup world. These experiences help students develop problem-solving skills, adaptability, and a deeper understanding of the entrepreneurial ecosystem.
- **Organizing business plan competitions:** this provides a platform for students to showcase their innovative business ideas and receive feedback from judges comprising industry professionals and investors. These competitions encourage students to refine their business concepts, articulate their value propositions, and develop viable business models. Winning teams often receive financial support, mentorship, and guidance to further develop and launch their ventures.

7.9.3.4. Entrepreneurship & Innovation Mentoring

Programs are needed to qualify talents and connect them with industry through:

- **Mentorship programs:** These programs connect students and researchers with experienced entrepreneurs who can guide them through the entrepreneurial journey. Business plan competitions provide opportunities for students to showcase their ideas, receive feedback, and secure funding. Access to funding, industry connections, and entrepreneurship support services further bolster students' entrepreneurial projects.
- **Organizing networking events, entrepreneurship conferences, guest lectures, and panel discussions:** This type of event allows students and researchers to interact with experts, successful entrepreneurs, and investors. These events create opportunities for knowledge exchange, idea sharing, and potential collaborations. They also expose students to diverse perspectives, emerging trends, and innovative approaches within the startup ecosystem.

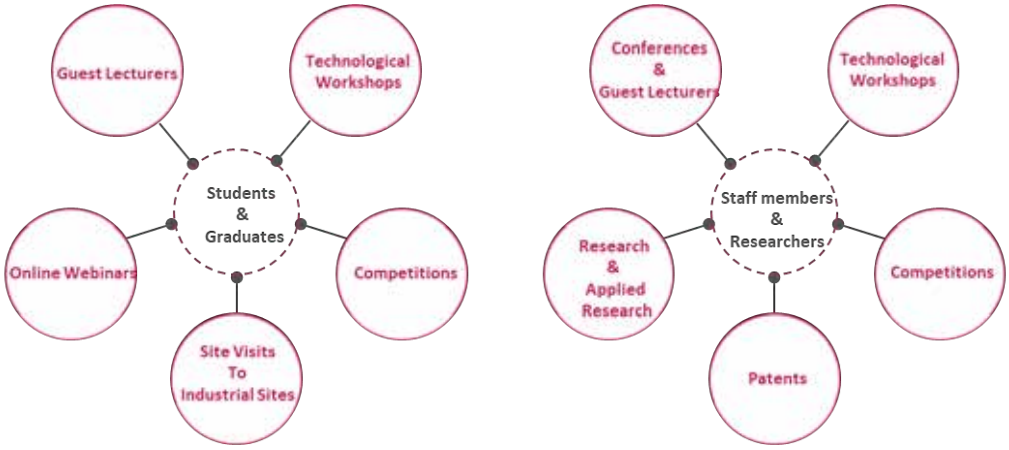


FIGURE (7 - 17) : ASPECTS OF PROMOTING INNOVATION TO STUDENTS, STAFF MEMBERS, AND RESEARCHERS.

7.9.4 Funding

Egyptian universities collaborate with funding agencies, public institutions, and private investors to provide financing and investment opportunities for startups and innovative projects. Various programs also offer financial support to technology startups through grants and seed funding.

FIGURE (7 - 18) : EXAMPLES OF FUNDING AGENCIES

7.9.4.1 Funding from the Ministry's Funding Institutions

The ministry establishes funding institutions or programs to support research, innovation, and entrepreneurship. These institutions provide grants, loans, or other financial resources to university startups and projects. These funds can be used for research and development, prototype creation, market validation, and other essential steps in the startup journey.

7.9.4.2 Governmental Funding

The government itself allocates funds to support innovation and entrepreneurship within universities. This could include initiatives aimed at fostering a culture of innovation, improving the university-industry collaboration, and encouraging commercialization of research.

7.9.4.3 Private Funding

Private investors such as angel investors and venture capital firms, play a crucial role in supporting university startups. These investors provide capital in exchange for equity in the startup. Private funding can be a significant source of financing for startups, helping them scale and grow their businesses.

7.9.4.4 International Funding & Investments

In the globalized world, startups often seek funding from international sources. This could involve attracting investments from foreign venture capitalists or participating in international accelerator programs and competitions. International funding not only provides financial support but also opens doors to new markets and networks.

FIGURE (7 - 19) : EXAMPLES OF LOCAL AND INTERNATIONAL FUNDING AGENCIES

7.9.4.5 Funding Opportunities

Funding opportunities can be made available through:

A. Creating startup incubation programs to support pre-incubation, incubation, acceleration through the following:

- Conducting focus groups and collecting lessons learned from existing university incubators.
- Creating models for single-site, multi-site, and virtual incubators.
- Connecting existing university pre-incubators and incubators with the innovation network to save and share resources.
- Establishing startup pre-incubators and incubators across universities and adding them to the network based on opportunity mapping.

B. Creating an investment fund to invest in seed stage and growth stage deep tech startups:

Egyptian universities can collaborate with funding agencies, public institutions, and private investors to provide financing and investment opportunities for startups and innovative projects. Programs like those mentioned earlier also offer financial support to technology startups through grants and seed funding.

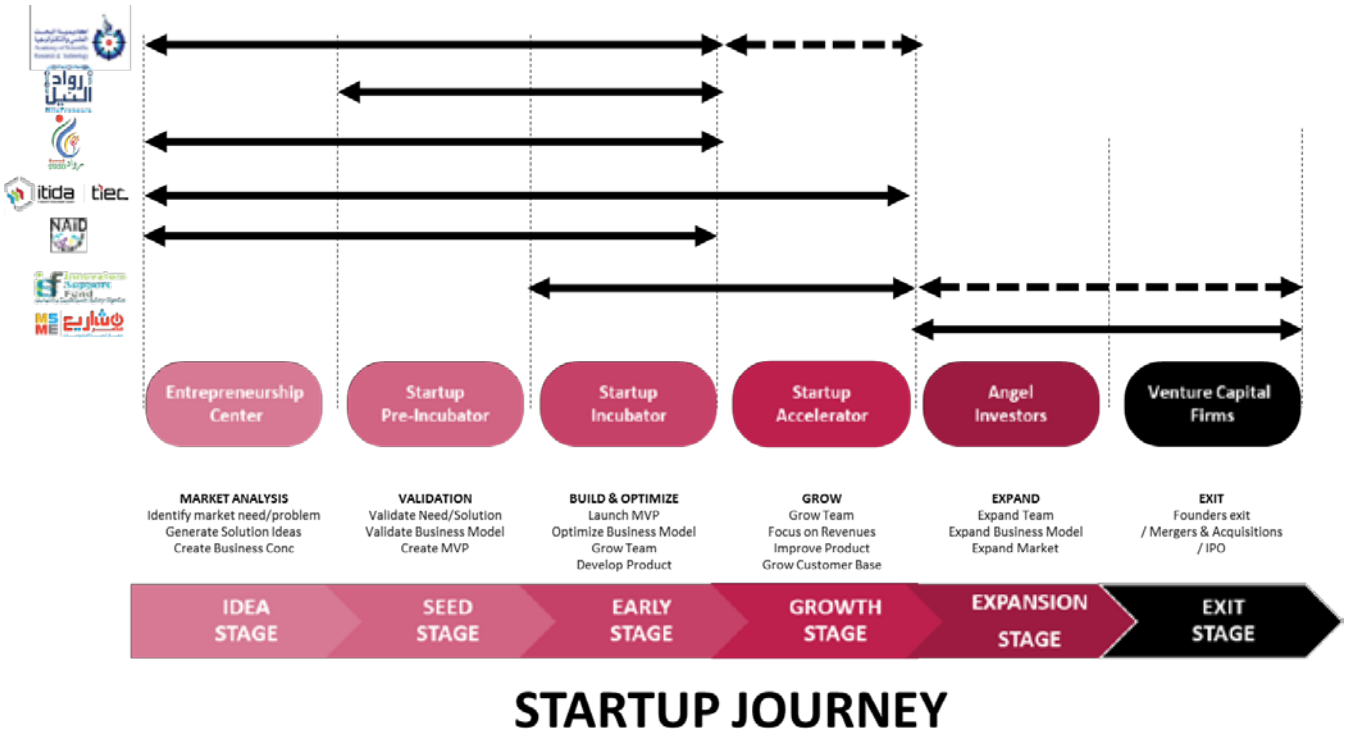


FIGURE (7 - 20) : STARTUP JOURNEY AND THE CONTRIBUTION OF FUNDING AGENCIES

Funding agencies play a significant role in supporting developments in technology. They provide financial resources at different stages of the technology readiness level (TRL) framework, which assesses the readiness of a technology for implementation or commercialization. Specifically, funding is crucial in the initial seven stages of the TRL, which encompass the formation of the concept, research and development, and the creation of an industrial prototype. During these stages, funding is channeled through technology pre-incubation, research labs, technology transfer offices, and centers of excellence. These funding investments enable the progression of technologies from early-stage concepts to tangible prototypes with potential for industrial applications. By supporting technology development, funding agencies contribute to the advancement and commercialization of innovative solutions, fostering economic growth and societal progress.

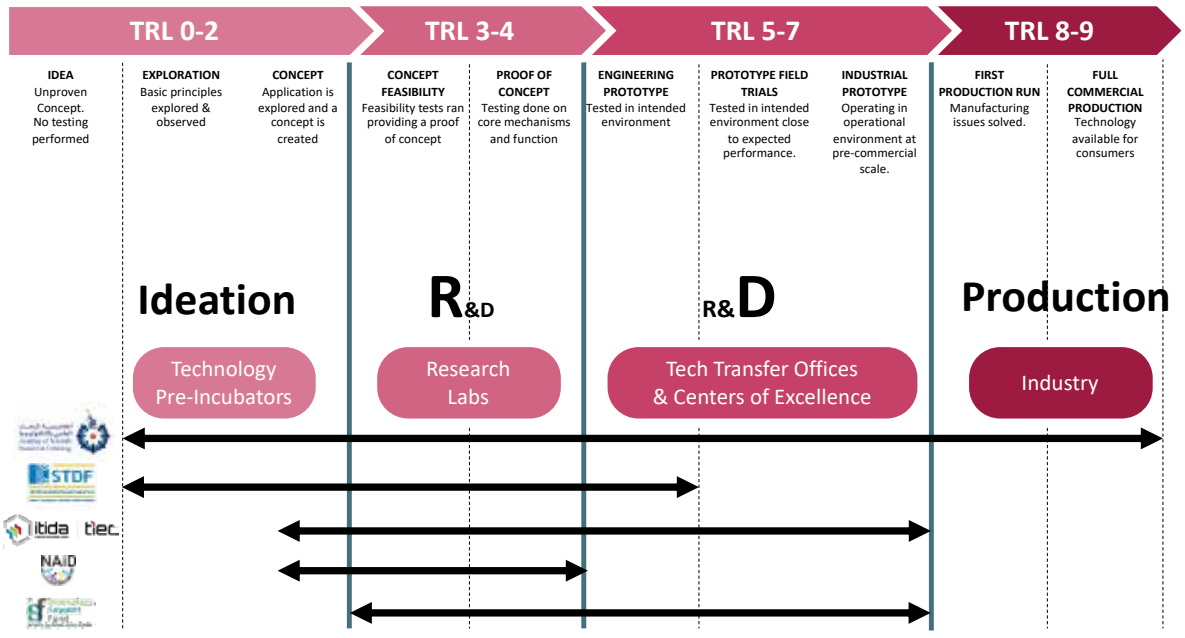


FIGURE (7 - 21) : TECHNOLOGY READINESS LEVEL (TRL) AND THE POSSIBLE CONTRIBUTION OF FUNDING AGENCIES

C. Creating the Egyptian Innovation Olympics

The Egyptian Innovation Olympics are a prestigious event that celebrates and showcases the innovative capabilities of students and young entrepreneurs in Egypt. It serves as a platform to recognize and reward exceptional ideas, projects, and startups across various fields and aims to foster a culture of innovation, entrepreneurship, and problem-solving among the youth of Egypt.

The event typically involves a series of competitions, challenges, and exhibitions where participants present their innovative solutions, prototypes, and business models. These can range from technological innovations, social entrepreneurship initiatives and sustainable solutions to disruptive ideas that address pressing societal challenges. The Egyptian Innovation Olympics bring together talented individuals from universities, research institutions, and startup communities and offer a unique opportunity for participants to showcase their innovative projects, gain valuable feedback from industry experts and mentors, and connect with potential investors, partners, and collaborators.

The total investments and funding in this event can reach up to 100 million pounds throughout its 4 stages:

1. Stage of stimulation and discovery of ideas and innovations
2. Business model development stage
3. Incubation stage
4. Acceleration and growth support stage

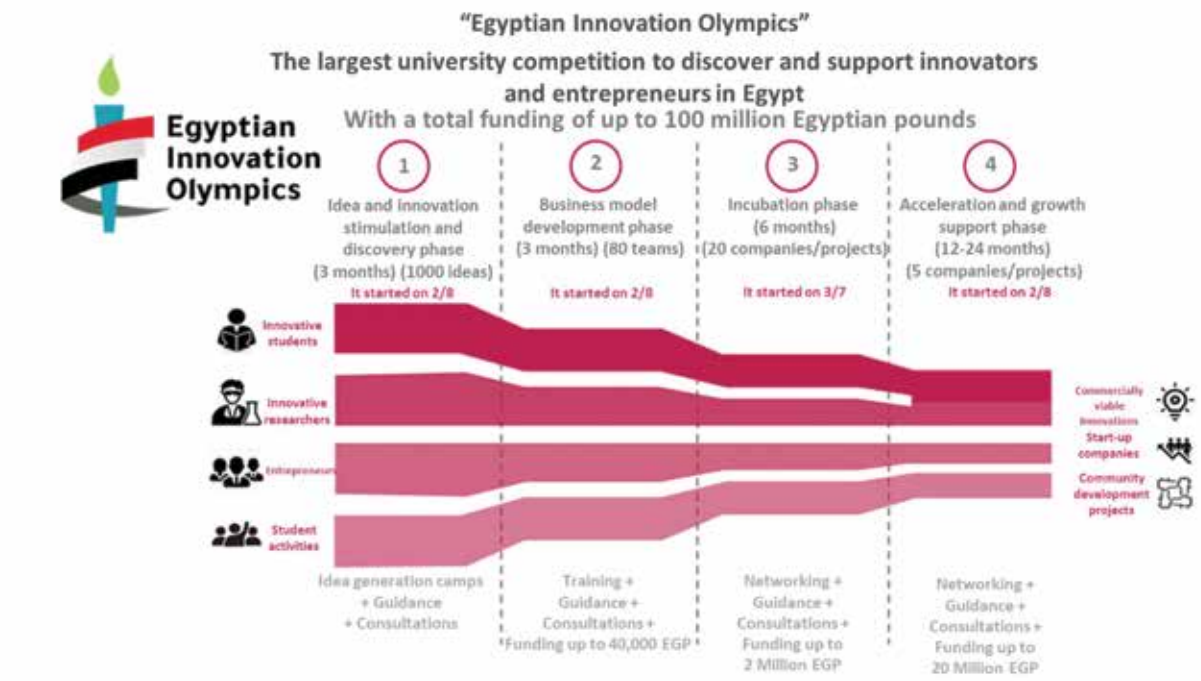


FIGURE (7 - 22) : THE STAGES OF THE EGYPTIAN INNOVATION OLYMPICS

7.9.5 Awareness & Communication

7.9.5.1 Awareness Activities

Awareness activities involve organizing events, workshops, seminars, and conferences that highlight the importance of entrepreneurship and innovation within the university community. These activities can provide a platform for students, faculty, researchers, and entrepreneurs to share their experiences, insights, and success stories. They also offer opportunities for networking, collaboration, and idea exchange.

7.9.5.2 Mass Media

Drive mass media channels such as newspapers, television, and radio to broadcast success stories, interviews, and articles

related to university startups, innovation initiatives, and the impact of entrepreneurship on society. Mass media can play a significant role in reaching a broader audience and shaping public perception.

7.9.5.3 Social Media Campaigns

In the digital age, social media is a powerful tool for spreading messages widely. Social media campaigns can be designed to showcase innovative projects, highlight the achievements of startup founders, share educational content, and engage the university community in discussions about entrepreneurship and innovation.

7.9.5.4 National Innovation Network Platform

A national innovation network platform serves as an online hub where universities, startups, investors, and other stakeholders can connect, collaborate, and access resources related to entrepreneurship and innovation. This platform can include information about funding opportunities, events, mentorship programs, and success stories.

7.10 CONCLUSION

In conclusion, the chapter highlights the role of fostering innovation and entrepreneurship within the academic landscape. Throughout the chapter, various key aspects and strategies that contribute to the success of innovation and entrepreneurship initiatives in higher education are explored. These include establishing dedicated innovation and entrepreneurship centers, promoting interdisciplinary collaboration, fostering a supportive ecosystem, and engaging with industry partners. By embracing these approaches, universities and colleges can create an environment conducive to creativity, risk-taking, and practical application of knowledge.

It also highlights the importance of collaboration between academia, industry, and government in advancing innovation and entrepreneurship. Such mutually beneficial partnerships that support research, mentorship, funding, and commercialization of ideas bridge the gap between theory and practice, allowing students to gain practical experience, incubate startups, and contribute to economic growth.

While progress has been made, challenges remain. Access to funding, navigating bureaucratic processes, and strengthening interdisciplinary collaboration are areas that require further attention. However, the commitment and collaboration between universities, government entities, industry partners, and international institutions highlight a promising future for innovation and entrepreneurship in Egyptian universities.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Bacia da Somália
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Mayotte (França)
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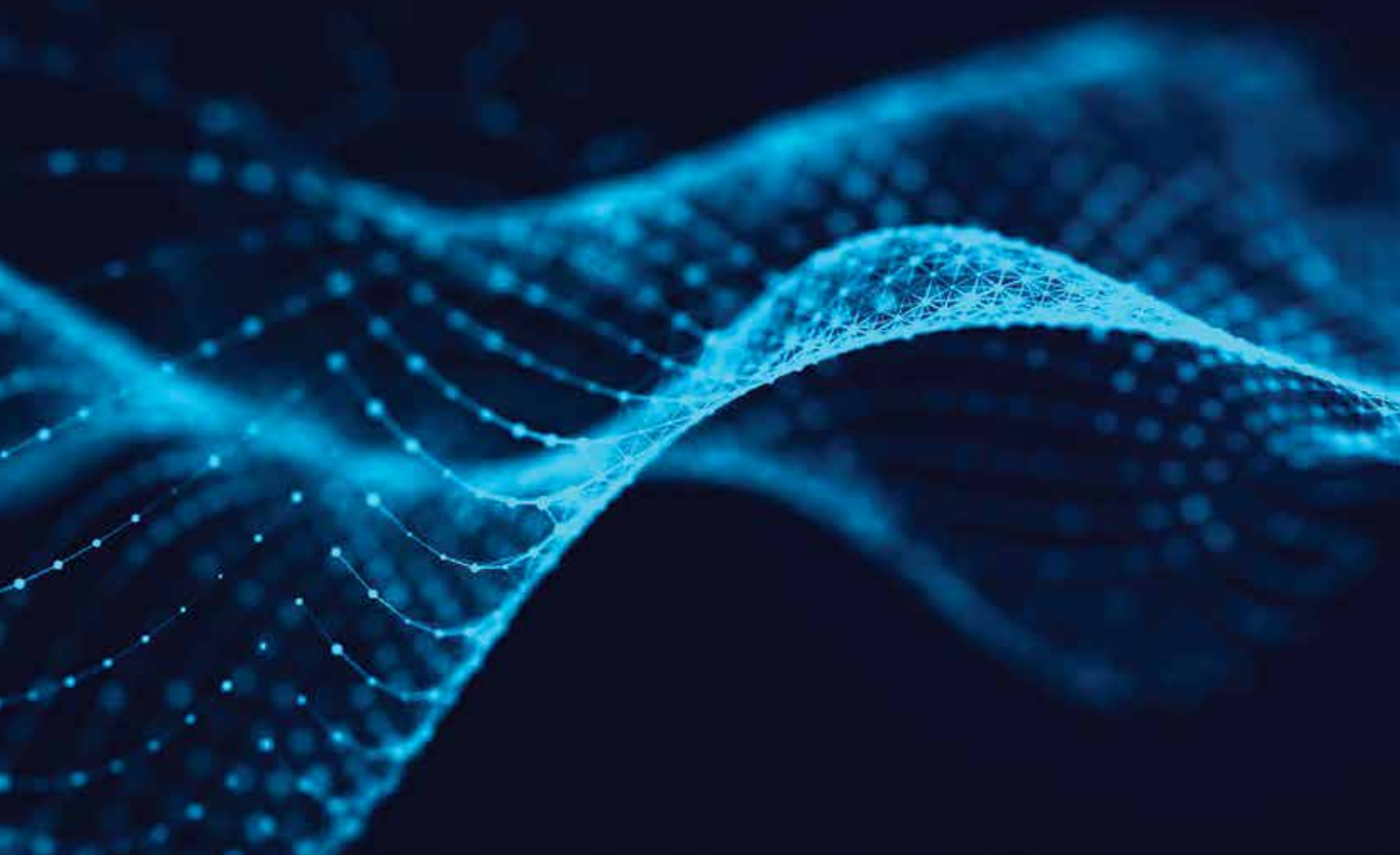
Zanzibar
Dar es Salaam
Moçambique
CANAL DE

Arab Republic of Egypt

وزارة التعليم العالي والبحث العلمي

Ministry of Higher Education
& Scientific Research

CONCLUSION



CONCLUSION

The Egyptian Higher Education and Scientific Research Blueprint represents an important effort to address challenges and gaps within the current higher education landscape in Egypt. Through an in-depth analysis of the existing situation, this blueprint has identified key areas of improvement and proposed a comprehensive framework built upon seven main principles: **Integration, Interdisciplinarity, Connectivity, Effective Participation, Sustainability, International Reference, and Innovation & Entrepreneurship**. These pillars are designed to drive transformation and foster excellence in Egyptian universities, positioning them as centers of knowledge, innovation, and global recognition.

Integration is a fundamental principle that promotes collaboration and synergy among educational institutions across the seven regions through the formation of regional consortiums. The integration of knowledge and expertise from diverse educational institutes with industry can create a dynamic intellectual environment that fosters holistic understanding and innovative problem-solving. By making use of the resources and expertise of multiple institutions, the consortium can offer a thriving ecosystem that supports local development and empowers the region to meet its educational and economic requirements effectively. Additionally, this integration allows institutions to introduce new programs that bridge the gap between existing offerings and market needs.

Interdisciplinarity complements integration by advocating for collaboration and breaking down barriers between disciplines. By encouraging collaboration and the exchange of ideas, HEIs in Egypt can create an environment that promotes innovation and creativity. Interdisciplinary approaches in education and research enable the exploration of complex issues from multiple perspectives, leading to comprehensive solutions that address the root causes of problems. Accordingly, HEIs plan to prioritize the development of interdisciplinary programs and initiatives that encourage students and universities to collaborate across disciplines, ensuring a learning experience that prepares graduates well for the interdisciplinary challenges encountered in their professional lives. This principle takes us to the next principle, connectivity, which is necessary across different levels in order to realize both interdisciplinarity and integration.

Connectivity, both physical and virtual, plays a crucial role in creating an inclusive learning environment. By enhancing infrastructure, expanding digital resources, and promoting international collaboration, HEIs in Egypt can create a connected educational ecosystem that facilitates knowledge exchange. Improving connectivity will enable universities to reach a broader audience and provide educational opportunities for students from diverse backgrounds, regardless of their geographical location. Embracing digital technologies and fostering a culture of digital transformation that can equip HEIs with the power of virtual learning, online collaboration, and global networking, positioning them at the forefront of the digital era.

Effective participation recognizes the role of higher education in building the economy and society. It highlights the importance of building university investment arms through the establishment of companies that initiate investments with values that support sustainable development, encourage innovation, and minimize consumption. The investment backbone provided by these companies enables universities to transform their intellectual capital into tangible economic and societal impact. Effective participation also contributes to social cohesion, as it involves engaging with local communities and addressing their needs and aspirations. To realize these goals, the overall approach must take sustainability into account.

Sustainability is a critical principle that acknowledges the importance of integrating sustainability dimensions into HEI strategies. The economic dimension focuses on responsible resource management, increasing income, and developing partnerships with the labor market and other entities to ensure economic sustainability for institutions and individuals while promoting collaboration and entrepreneurship. The environmental dimension emphasizes the development of the built and virtual environment of institutions, including improving infrastructure and the integration of digital systems. It highlights the importance of optimizing efficiency and incorporating sustainable practices in teaching, research, and development. The social dimension focuses on establishing well-structured social systems within higher education institutions. It includes human resource development, promoting solidarity and care within society, and collaborating with social solidarity

NGOs to address social challenges. In addition, this principle also discusses the role in implementing education for sustainability and contributing to various SDGs, such as ending poverty, ensuring healthy lives, promoting gender equality, and addressing climate change.

International reference is a principle that emphasizes the significance of benchmarking against global standards and best practices in higher education. By aligning with international standards, Egyptian HEIs can enhance their reputation, attract global talent, and foster collaborations with renowned institutions worldwide. Strategic partnerships and international exchange programs can facilitate the transfer of knowledge and promote cultural exchange, diversity, and global understanding. Engaging with international networks and creating opportunities for students and faculty to gain international exposure can help enrich the educational experience and facilitate competing on a global scale.

The final principle, **innovation & entrepreneurship**, recognizes the transformative power of innovation and entrepreneurship in driving economic growth and societal development. By fostering an ecosystem that looks after creativity, supports idea generation, and provides resources for entrepreneurial projects, HEIs can cultivate a generation of innovators, job creators, and change agents. Incorporating entrepreneurship education into the curriculum and establishing incubators and accelerators on campuses that can empower students to transform their ideas into practical solutions, contributing to economic diversification, job creation, and the development of a thriving innovation ecosystem.

By focusing on **integration** and **interdisciplinarity**, the blueprint emphasizes the importance of collaboration, going beyond traditional academic cooperation and fostering a holistic approach to education and research. **Connectivity** and **effective participation** highlight the significance of technological advancements, infrastructure development, and inclusive governance to create a connected and engaged educational system. **Sustainability** stresses the importance of universities operating as open systems, engaging with internal and external stakeholders, and collaborating with other universities and organizations. It highlights the need for universities to be open to knowledge generated outside their walls and to incorporating sustainability principles in all activities. It also emphasizes the need for interdisciplinary and transdisciplinary research, as well as the transfer of knowledge and skills. **International reference** aims to align the Egyptian universities with global standards and foster international collaboration, while the **innovation & entrepreneurship** principle encourages the cultivation of an entrepreneurial mindset, empowering students to transform ideas into tangible outcomes.

In conclusion, the Egyptian Blueprint of Higher Education and Scientific Research presents a comprehensive roadmap for the transformation and revitalization of higher education in Egypt. By embracing the principles of **Integration, Interdisciplinarity, Connectivity, Effective Participation, Sustainability, International Reference,** and **Innovation & Entrepreneurship**, HEIs can embark on a journey towards excellence, relevance, and global recognition. The successful implementation of this blueprint can position Egypt as a key player in the global knowledge economy, attract international talent and investment, and contribute to the sustainable development and prosperity of the nation and its people. It is the role of all stakeholders—government, universities, faculty, students, industry partners, and civil society—to collaborate and commit to the realization of this vision, ensuring a brighter future for Egyptian higher education and the nation.

ACRONYMS AND ABBREVIATIONS

ASRT	Academy of Scientific Research and Technology
CASM	Culture Affairs and Scientific Missions
CDM	Central Department of Missions
CLC	Community Learning Center
CNCI	Category Normalized Citation Impact
CoE	Centers of Excellence
CSM	Career Service Management
EHR	Electronic Health Record
EJEP	Egypt-Japan Education Partnership
E-JUST	Egyptian-Japanese University for Science and Technology
EKB	Egyptian Knowledge Bank.
ERP	Enterprise Resource Planning
ESD	Education for Sustainable Development
FWCI	Field-weighted citation impact
GIL	Governmental Innovation Labs
GIS	Geographic Information System
GSP	Graduate Scholar Program
HCST	Higher Council for Science and Technology
HEI	Higher Education Institution
HIS	Hospitals Information System
ICT	Information and communication technology
ICTE	Information and Communication Technology & Entrepreneurship
ILO	International Labour Organization
IoT	Internet of Things
IPR	Intellectual Property Rights
ISF	Innovators Support Fund
KTA	Knowledge and Technological Alliances
KTP	Knowledge Transfer Partnerships
LMS	Learning Management Systems
MCIT	Ministry of Communications and Information Technology
MEA	Middle East and Africa
MENA	Middle East and North Africa
MOHESR	Ministry of High Education and Scientific Research
MRL	Market Readiness Level
NAQAAE	National Authority for Quality Assurance and Accreditation of Education
NiN	National Innovation Network
PPP	Public-private partnership
S&T	Science and Technology
SDG	Sustainable Development Goals
SFIA	Skills Framework for the Information Age
SIL	Societal Innovation Labs
SIS	Student Information Systems
SSR	Student-to-staff ratio
STDF	Science, Technology & Innovation Funding Authority
STI	Science, Technology, and Innovation
SURA	Smart University Reference Architecture
TIC	Technology Innovation Centers
TICO	Technology and Innovation Commercialization Offices
TRL	Technology Readiness Level
UCCD	University Centers for Career Development
USDA	Universities Support and Development Authority