Design For Sustainability In Iran Throughout An Open Network Of Local Design Universities

The Diffusion Strategic Path And An Enabling Open Learning Resource Package

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I wish to dedicate this thesis to my family, who have given lots of love and support to the continuance of my education.

ABSTRACT English

In recent years with the most environmental and economic crises, Iran's society suffers from many challenges. The challenges that remain unresolved. Hence, Iran society is more permeable towards the radical innovation process that needs to take place seriously to change current unsustainable consumption and production patterns. In order to create this sustainable human consumption and production, a complete revamp of the consumption structure is needed.

Sustainability is a challenge for industrialized, emerging as well as low-income contexts. However, achieving this goal in the different types of context requires differing paths (Hart and Milstein 1999) and Design for Sustainability (DfS) is an emerging and significant domain. It is also one of the prime needs of our considering the burden of human consumption and production.

The research and project presented in this thesis outlines a path for Iranian design community, actually, the newest generation of Iranian designers to promote their design ability in regard to design for sustainability (DfS). In fact, this thesis presents a vision and strategic path that could be adapted to higher design educational system and used as a good resource for all designers.

The main contents of this thesis include; first explore the current status of Iran related to the Sustainable development and the role

of it in the Higher education system of Iran. Then a full analysis around the place of sustainability design in Iran's Industrial design schools and look for opportunities based on problems on existing sustainability design-related programs.

Then, following the ideation session, this lead to a proposed design solution, a concept released, this concept contains two parts. First, arrange a strategic path by introducing the LeNS learning network on Sustainability as a perfect resource to the Iranian design community, which by joining this platform it provides the best resource for sharing materials and tools from multiple cultural contexts in open source and copyleft ethos. As the second part, design an open learning resources packages for two levels of Industrial Design (undergraduate and postgraduate) Education System, applied them on LeNS platform then formally insert them into the current curriculum of the Industrial Design Education System.

Both of these parts were performed by receiving acceptance of four Design Universities in Iran (with the cooperation and supervision of Professor Mehdi Fallah, head of the Industrial Design Department of the Art University of Tehran), applied formally to the present Industrial Design Education System curriculum.

The author believes that propose of this thesis by designing this starategic path and open learning resource packages is to enable Iranian Designers to make an effective contribution to the development of innovative and sustainable solutions based on their local and enviromental challenges and existing unsustainable consumption patterns.

Keywords: *Enviromental Challenges/ Unsustainable Consumption patterns/ Design for Sustainability/ Iran higher education system/ LeNS learning network/ Open Learning resource Packages*

ABSTRACT Italian

Negli ultimi anni, con la maggior parte delle crisi ambientali ed economiche, la popolazione iraniana ha dovuto affrontare molte sfide. Le sfide che rimangono irrisolte. Da qui, la società iraniana è più permeabile verso il processo di innovazione radicale che deve essere preso seriamente in considerazione per cambiare i consumi e i modelli di produzione che, allo stato attuale, sono insostenibili. Per arrivare ad avere uno schema di consumi e produzione sostenibili sarà necessario un completo rinnovamento dell'intera struttura.

La sostenibilità è una sfida per i contesti industrializzati ed emergenti così come quelli a basso reddito. Tuttavia, raggiungere questo obiettivo nei diversi tipi di contesto richiede il seguire percorsi differenti (Hart e Milstein 1999) e Design for Sustainability (DfS) è un dominio emergente e significativo. È altresì necessario considerare principalmente il peso del consumo umano e della produzione.

La ricerca ed il relativo progetto presentati in questa tesi delineano un percorso per la comunità del design iraniana, in questo caso la nuova generazione di designer iraniani, per promuovere la loro capacità di progettazione in relazione al design per la sostenibilità (DfS). Questa tesi presenta una visione ed un percorso strategico che potrebbe essere adattato a un sistema educativo di progettazione di più ampio respiro e utilizzato come una risorsa per i progettisti di tutto il mondo.

I contenuti principali di questa tesi includono, esplorare innanzitutto la situazione attuale dell'Iran in relazione allo sviluppo sostenibile ed il suo ruolo nel sistema di istruzione superiore dell'Iran, un'analisi completa sul ruolo del pro-

getto di sostenibilità nelle scuole di disegno industriale iraniano e cercare punti di criticità ed opportunità basati su problemi relativi ai programmi di sostenibilità esistenti. A seguito della fase di ideazione, si è giunti alla proposta di una soluzione di design, un concetto rilasciato; questo concetto contiene due parti, l'introduzione della rete di apprendimento LeNS sulla sostenibilità come una risorsa perfetta per la comunità del design iraniana, che aderendo a questa piattaforma fornisce la migliore risorsa per condividere materiali e strumenti da più contesti culturali negli ethos open source e copy-left, come secondo parte, progettare un pacchetto di risorse di apprendimento aperto rivolto ai due livelli di istruzione universitaria nell'industrial design (bachelor e master degree) applicati formalmente all'attuale curriculum del sistema di educazione alla progettazione industriale. Entrambe queste parti sono state sviluppate ricevendo l'approvazione di quattro università del design Iraniane (con la collaborazione e la supervisione del professor Mehdi Fallah, capo del dipartimento di disegno industriale della Art University di Teheran), applicati formalmente all'attuale curriculum del programma formativo del Disegno industriale .

L'autore ritiene che il proposito di questa tesi, progettando questo percorso strategico e pacchetti di risorse di apprendimento tipo Open-learning consenta ai progettisti iraniani di dare un contributo efficace allo sviluppo di soluzioni innovative e sostenibili basandosi sulle loro sfide locali e ambientali e ai modelli di consumo insostenibili esistenti.

Parole chiave: Sfide ambientali / Modelli di consumo non sostenibili / Design per la sostenibilità / Nel sistema di istruzione superiore / Rete di apprendimento LeNS / Pacchetti di risorse di apprendimento aperto

ABSTRACT Farsi

ایران در سال های اخیر با بحران های زیست محیطی و اقتصادی بسیاری رو به رو شده است، که نتیجه آن نیز چالش های حل نشده ی بسیاری است. فرآیند تغییر الگوهای مصرف و ناپایداری های موجود درایران، نیاز یه اصلاح کامل ساختار مصرف دارد، این تغییر نیازمند نوآوری های پیشرویی است که باید به صورت جدی نیز پیگیری شوند. پایداری برای زمینه های صنعتی در حال ظهور و همچنین کم درآمد نوعی چالش محسوب می شود. و دستیابی به این هدف در زمینه های متنوع، نیازمند مسیرهای متفاوت نیز می باشد (Hart and Milstein,۱۹۹۱) یک دامنه در حال ظهور و قابل توجه (DfS) طراحی برای پایداری است. این نیاز یکی از نیازهای اصلی ما با توجه به نحوه ی مصرف و تولیدات انسانی است

دراین پایان نامه، مسیری برای جامعه طراحان ایرانی ارائه شده است، در واقع جدیدترین نسل از طراحان ایرانی، برای ارتقاء توانایی طراحی خود در زمینه طراحی برای پایداری (DfS) قرار دهد. در واقع، این پژوهش یک دیدگاه و مسیر استراتژیک ارائه می دهد که می تواند با سیستم آموزشی طراحی پیشرفته سازگار شود و به عنوان یک منبع خوب برای همه طراحان استفاده شود

مراحل اجرا در پژوهش پیش رو عبارت است از: بررسی وضعیت فعلی ایران مربوط به توسعه پایدار و نقش آن در نظام آموزش عالی ایران، سپس یک تجزیه و تحلیل جامع در رابطه با جایگاه طراحی پایدار در دانشگاه های طراحی صنعتی صورت پذیرفت و دنبال آن نقاط ضعف و قوت موجود در برنامه های مرتبط با طراحی پایداری ارزیابی گردید.و سرانجام پس از ایده پردازی ها صورت گرفته، طرحی به منظور حل مسئله انتخاب گردید

به عنوان یک LeNS طرح برگزیده شامل دو بخش است. ابتدا، معرفی شبکه یادگیری منبع عالی برای جامعه طراحی ایرانی، که با پیوستن به این پلت فرم بهترین منبع برای به اشتراک گذاری مواد و ابزار در زمینه های مختلف فرهنگی به صورت کپی آزاد و در بخش دوم، طراحی مجدد بسته های یادگیری باز برای دو سطح طراحی صنعتی (دوره کارشناسی و کارشناسی ارشد). هر دو بخش با پذیرش چهار دانشگاه طراحی صنعتی در ایران (با همکاری و نظارت پروفسور مهدی فلاح، مدیر گروه طراحی صنعتی دانشگاه هنر تهران)، به طور رسمی در برنامه آموزشی سیستم طراحی صنعتی پذیرفته و اعمال شد

هدف از انجام این پژوهش پیشنهاد و طراحی یک راهبرد استراتژیک و بسته های آموزشی مجازی است که طراحان ایرانی را قادر می سازد تا با ایجاد راهکارهای نوآورانه و پایدار بر اساس چالش های محیطی و الگوهای مصرف ناپایدار موجود کمک کنند

کلیدواژگان: چالش های محیطی / الگوی مصرف ناپایدار / طراحی برای پایداری بسته های آموزشی باز / *LeNS* / در نظام آموزش عالی / شبکه آموزشی

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PART ONE: RESEARCH

1.State Of The Art: Sustainable Agenda In Iran

Profile Of Iran

The Islamic Republic of Iran (I. R. Iran) is situated in South West Asia, located in the Middle East and is bordered by Iraq and Turkey to the west, Armenia, Azerbaijan, Russian Federation and Turkmenistan to the north, Afghanistan and Pakistan to the east. To the south, Iran borders Persian Gulf and the Oman Sea. The country occupies a total land area of nearly 1,650,000 square kilometers and is the second largest country in the Middle East after Egypt, with an estimated 78.8 million people in 2015. out of which 68% were in the 15-64 years old age group. The population growth rate is estimated at 1% per year. 63% of the population lives in cities, while the remaining 37% live in rural communities.

Iran is semi-arid and has diversity of climates. The "Alborz" mountain range is located in the north of the country with mount Damavand, its highest peak, at 5671 meters above the sea level. The "Zagros" mountains stretch from northwest to southeast. The middle and eastern parts of Iran are less mountainous with fewer peaks. Except for the northern and southern seashores, where high humidity is prevalent, humidity and rainfall are lower from north to south as well as from east to west. the average annual rainfall is less than 250 mm, which is scattered irregularly both in terms of time and area.

The main language of Iran is Farsi (Persian) and the country as a whole has an excellent literacy and numeracy rate, well above the regional average.
The population of Iran is highly educated and skilled. Universities in Iran collectively produce over 750,000 skilled graduates an nually. 31% of these graduates come from fields related to engineering and construction putting them 3rd in the world after USA and Russia.

In 2010, Iran ranked 70th on the Human Development Index (HDI) out of 169 countries, with an HDI of 0.70. Over the years, Iran has successfully delivered basic services such as health, education and electricity to its people and is an early achiever or on track to achieve most of the Millennium Development Goals (MDGs) by 2015.[1]According to the Human Development Report 2015, between 1980 and 2014, life expectancy at birth increased by 21.3 years, mean years of schooling increased by 5.9 years and expected years of schooling increased by 5.9 years.

Iran is the second largest economy in the Middle East and North Africa (MENA) region after Saudi Arabia, with an estimated Gross Domestic Product (GDP) in 2016 of US$412.2 billion. Iran's economy is characterized by the hydrocarbon sector, agriculture and services sectors, and a noticeable state presence in manufacturing and financial services. Iran ranks second in the world in natural gas reserves and fourth in proven crude oil reserves. Economic activity and government revenues still depend to a large extent on oil revenues and therefore remain volatile.

Iran has a heavy reliance on energy-intensive industries for domestic economic production and export. with a century of exploitation, extraction and refining, it also has a high dependence on oil products to

1. National MDG Report 2010, Central Bank of Iran national accounts

meet primary energy needs as well as energy demands from energy-intense petrochemical and metal industries. This is compounded by low energy prices and poor energy efficiency.

The continued high-energy intensity and rapid pace of consumption of oil products has been recognized as a serious threat to the economy. To ensure the export of crude oil as the key source of foreign revenues, while simultaneously providing energy for domestic consumption, development and welfare, became the most crucial challenge.

Diversification of energy sources for domestic consumption and specifically the substitution of natural gas for oil products have been adopted and successfully implemented. Certain policies and programs, such as energy price reform and expanding production capacities and grids in gas and electricity were selected to support the main goal and strategy.

The main policies objectives of this diversification were:

• Provision of more clean energy, i.e. electricity, gas and renewable energy, on the assumption that, given the competitiveness of prices, they would be preferred and hence substituted for oil products by customers for indoor heating and cooking
.
• Supporting expansion of renewable energies.

• Rationalizing energy carriers' prices both with regard to each other and compared to general price indices.

Iran was the world's highest provider of fuel subsidies in 2009 and it is estimated that as much as 10% of GDP (equal to over $40bn) was spent on subsidies for oil and gas products and electricity. The government have been implementing a reform plan for subsidies since 2010 and the second phase of it was initiated by President Rouhani in 2015. Subsidy curtailment is one of the key drivers for renewable energy development in Iran.

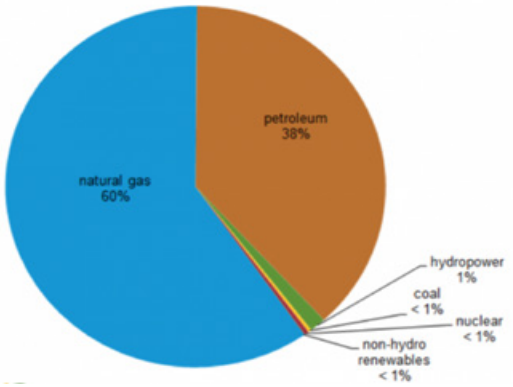

Figure 1. Iran's Total Energy Consumption

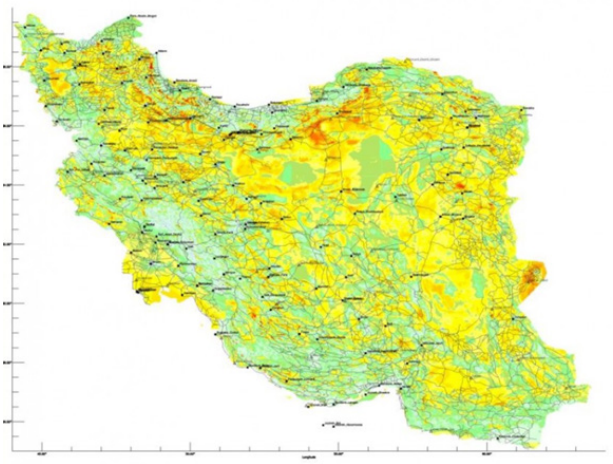

Figure 2. Iran wind map

Renewable Energies In Iran

Following the energy crisis in the 1970s, some developed countries decided to invest heavily in the development of renewable energies. Following worldwide interest in the subject, Suna (The Renewable Energy Organization of Iran) was established in 1995 for the purpose of assembling updated information and technology in connection with the utilization of renewable energy resources, the measurement of potentials, and the execution of solar, wind and geothermal, hydrogen and biomass projects.

Iran possesses rich and diversified sources and potential for developing renewable energy. Iranian policymakers have shown great interest in renewable energy (R.E.) sources to improve energy security, reduce internal dependence on hydrocarbons, and meet its projected growth in electricity demand.

The Iranian Power Generation, Transmission, Distribution and Management Company (Tavanir) now estimates that renewables will generate around 10 percent of Iran's electricity production requirements within five years. Iran's Sixth Development Plan, a five-year government growth policy, includes a stipulation that its installed R.E. capacity should grow by 5,000 MW by 2018.[2]

Until recently, economic sanctions would have made achieving such an ambitious goal very difficult, if not impossible. However, due to the elimination of major restrictions on both domestic and foreign financing, investment goals of $10 billion by 2018 and $60 billion by 2025 now appear feasible.

2.PV Magazine. "Iran Reveals 5 GW Plans for Solar and Wind," May 2014.

Wind Potential

the wind power capacity in Iran was estimated to be around 100 000 MW, clearly demonstrating the huge potential for the development of wind farms. In terms of installed wind power capacity, Iran is ranked 51 out of 103 in the world (WWEA, 2014). B[3]ased on statistics obtained from Suna, currently 94 MW of electricity is being produced by existing wind power plants across the country. Manjil wind farm, the largest wind power plant located in Gilan, north Iran, uses 111 turbines with capacities ranging from 300 kW to 660 kW. Iran is well-positioned to rapidly scale up its wind power sector. The country already operates 15 wind farms and the vast majority of the components used to develop those farms were produced locally. Iran has made use of its abundant human capital to develop technological capabilities in turbine, generator, and inverter production.

3. http://www.satba.gov.ir/

Figure 3. Manjil wind Farm, Gilan, Iran

Solar PV Potential

Average solar radiation in Iran is about 19·23 MJ/m2 and is even higher in the central part of the country. Calculations show that the amount of useful solar radiation hours in Iran exceeds 2800 h/year. However, using solar energy to produce electricity in Iran is not very popular and the cost of these types of sites is relatively high at about US $3500/kW. By 2010, 634 rural households in Iran were receiving electricity derived from solar power. Regions having high potential for solar energy are: Shiraz, Tehran, Khorasan, Yazd, and Semnan (IAEA, 2000). With the recent removal of sanctions, Iranian companies will have greater access to a wider range of increasingly sophisticated solar technologies and financing to purchase and develop them.

Figure 3. Shiraz solar power plant

Geothermal Potential

Geothermal energy development in Iran was initially started by James R. McNitt, one of the UN experts who visited Iran in 1974 and reported that Iran had very promising prospects for geothermal energy development. Upon his recommendation, in 1975, a contract between the Ministry of Energy and ENEL of Italy in association with Tehran Berkeley of Iran was signed for the geothermal exploration of an area covering 260 000 km2 in the northern part of the country. A new updated and more accurate digital map of Iran detailing potential geothermal sites using a geographic information system was developed at Kyushu University in 2007. The results indicated 8·8% of Iran's land area as having potential for geothermal energy in 18 promising fields (Figure 5). However, Meshkinshahr geothermal power plant, located in north west Iran and with a capacity of 55 MW, is the only operational geothermal power station in the country.

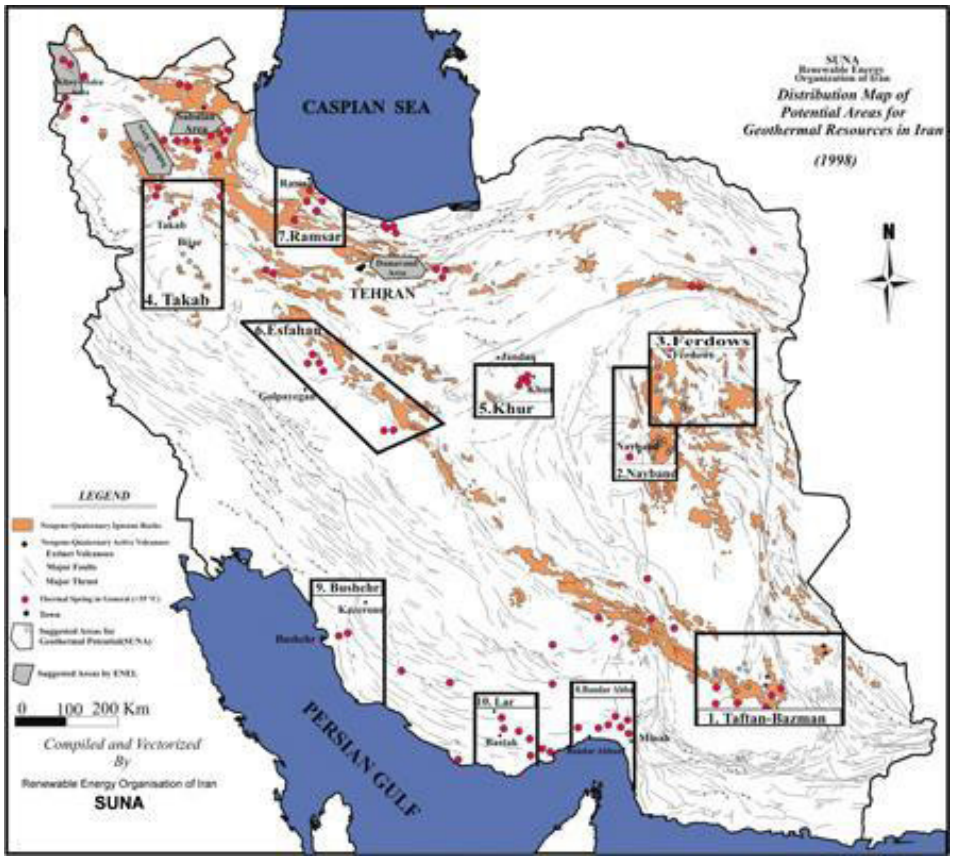

Figure 4.Geothermal energy potential in IRAN

State Of The Art:

Iran's Sustainable Development Index

In order to develop appropriate policies and to coordinate between country's socio-economic plans, environmental protection goals and the achievements of 1992 Earth Summit in Rio, the government of the Islamic Republic of Iran has established "The National Committee for Sustainable Development", whose members are the fully authorized representatives from different ministries and organization secretariat has been placed in the Department of the Environmental. Considering the main topics that has been set by UN for evaluation in the 16th session of the Commission on Sustainable Development (CSD), the government of Islamic Republic of Iran made the efforts to collect and gather the necessary information according to the format proposed by UN, with the help and cooperation of relevant organizations and ministries (especially Ministry of Agricultural Jahad, Ministry of Energy, Department of the environment, Ministry of Foreign Affairs). The Government of Iran is committed to the concept of sustainable development through linking the environment to the overall development process. Although a Department of Environment has existed since 1971, Iran has not yet developed a policy of sustainable development because short term economic goals have taken precedence. A report by the United Nations Environment Program ranked Iran at 117th place among 133 countrie in terms of environmental indexes.

Iran's Current Environmental Issues

Iranian society suffers from many challenges. The challenges that have persisted throughout these years, and many of them remain unresolved, and new challenges for the Iranian community are created day by day. Drought, increased population, war, air pollution, climate change, industrial and agricultural production, sanctions, inefficient water and natural resource use, and lack of enforcement of existing environmental regulations have contributed to Iran's current environmental crisis. Insufficient water resources are forcing people to migrate, putting pressure on others. Aquifers are being drained. Air pollution has made living conditions in Iran's cities increasingly challenging. Wind erosion is furthering the desertification of agricultural land, creating greater production demand on remaining arable areas. Biodiversity is under threat.

Recently, the Center for Strategic Studies of the Presidency examined the main issues and scenarios facing Iran in 96 years by conducting the "Future Study of Iran in 2017", and on this basis, three issues of "the need for structural reforms", "water supply crisis" and "unemployment "At the top of the main issues according to priority, and in fact reflect the views of the experts. An interesting point, however, is the contribution of social, environmental, or social consequences to this study. As out of a total of 100 challenges that found out, 52 challenges come from social issues.[1]

1.http://aftabnews.ir/fa/news/438812

Iran's environmental future can be positively influenced by the collaboration of the public, private and non-profit sectors. In this situation awareness and education, along with greater financial and human resources, will be necessary to tackle the problem.

Public Awareness Regard To Sustainable Consumption

Even with massive rural–urban migration, Iran is still predominantly rural. On the local level, rural-based traditional lifestyles are being replaced by a western-like, product-based well-being mind-set, based on a resource-intensive economy and individualistic values. This, however, does not necessarily translate into actual well-being of the majority of the population. Nevertheless, it is in the cities that it is easier to perceive the impact of socio-environmental pressure deriving from accelerated economic growth, since cities are the arena where the transformation processes are more dynamic.

Increasing the awareness of the public about the importance of environmental issues in the form of sustainable development in the world has a high coefficient. By setting up 5 technical committees in 2005 the Environment and Sustainable Development Council of Tehran Municipality too has started work with the aim of organization of activities related to environmental issues. Some of the important programs of this Council is culture building and raising the awareness of the citizens regarding city environmental issues and changing consumption patterns of natural resources, and food consumption patterns. Use is made of the media, include the National Radio and Television, newspapers, weekly and monthly magazines and other publications to create awareness of the public with regard to issues of sustainable consumption and production patterns. For example, there is a limited campaign through mass media to sensitize people toward consumption of gas, water and electricity. The Gas Company and the Ministry of Power (water and electricity) are providers and sponsors of the programs. The purpose of the activities is limitation and optimization of consumption. The National Television broadcasts short video clips on the importance of water consumption for various groups and viewers, including children and youth. Women, who are important factors in determining consumption patterns at the family levels, are also targeted in these education programs.

Figure 5. Water crises awarness posters

Figure 6. United Nation Logo

United Nations Activities In Iran

The United Nations' work in Iran focuses primarily on development work and humanitarian assistance. Whereas the latter deals primarily with the question of support to Afghan refugees, the former covers a number of current Government priorities. These include poverty, health, the environment, disasters and drug control.

Today there are 18 UN agencies, funds and programs working on the ground in Iran. There are approximately 400 staff members (90 per cent of whom are local) work in duty stations in different parts of Iran with most being based in Tehran.[1]

Since 1966, UNDP has been a committed partner of the Government of Iran in fulfilling its development objectives. UNDP has also been working closely with other development partners, such as civil society, academic institutions and the private sector, by providing technical assistance and knowledge for more than 50 years. UNDP is committed to help them find their own solutions to meet global, regional and national development challenges.

1.www.un.org.ir

Some achievements that linked to the previous UNDP Country Programme Document which started in 2012 and ended in 2016 and focused on the below four priority areas:

1.Inclusive Growth and Development:
- Between 1990 and 2014 Iran's HDI value increased from 0.567 to 0.766.
- the Carbon Sequestration Project have been used as success models and replicated by the government with the use of national funds.

2. Health and Development:
- The number of malaria cases in Iran is at its lowest level in 30 years.
- The incidence rate of Tuberculosis (TB) in 2015 decreased by 50% compared to its level in 1990. TB mortality rates also decreased by 64% in 2015 compared to 1990.
- Advocacy and training activities have contributed to a rise in public awareness, resulting in the reduction of stigmatization on the issue of HIV/AIDS.
- Bio-Behavioral Surveillance surveys, initiated by Global Fund's HIV project, now figure prominently in the HIV National Strategic Plan and are run biennially.

3. Environment and Sustainable Development:
- Conservation of Iranian Wetlands project in cooperation with national partners practiced "ecosystem-based approach" for management of wetlands and biodiversity
- Iran is an early achiever of the phase out milestones set by the Montreal Protocol (a protocol to the Vienna Convention for the Protection of the Ozone Layer
- Conservation of the Asiatic Cheetah project had significant effect in making Cheetah conservation as a national priority and evaluation of the project confirmed that Iran has saved this iconic species from extinction and provided a platform for upgrading of protected areas in seven out of ten Cheetah habitats.
- The Carbon Sequestration project near Birjand has provided a participatory rangeland rehabilitation model, creating alternative jobs for the rural poor while making important contributions to climate change mitigation.
-UNDP natural resources management projects had significant effects on embedding collaborative management, systematic analysis of value and sustainable use of natural resources at different managerial level in country

4. Disaster Risk Management:
-Scaling up of safe schools, neighborhoods and hospitals based on the two project pilot sites in the cities of Gorgan and Kerman.
-Disaster risk management has been integrated nation-wide in all government offices.
-Decision-making support tools are now in place, including a National Information Portal and a National Disaster Database.

As an upper-middle income country, Iran is well placed to play a leading role in exchanging knowledge and technical expertise through South-South cooperation, both in the region and globally. UNDP will continue to support Iran in these endeavors, drawing on its vast global knowledge network and established best practices.

2030 Agenda For Sustainable Development And Iran

The United Nations Industrial Development Organization (UNIDO) and the United Nations Educational, Scientific and Cultural Organization (UNESCO) are implementing a joint programme to help the Islamic Republic of Iran to reach the Sustainable Development Goals (SDGs).

The Sustainable Development Goals (SDGs), otherwise known as the 2030 Agenda for Sustainable Development, are a universal goals aimed at ending poverty, protecting the planet, ensuring prosperity for all and promoting partnerships.

These 17 Sustainable Development Goals and 169 targets which we are announcing today demonstrate the scale and ambition of this new universal Agenda. They seek to build on the Millennium Development Goals and complete what these did not achieve. They seek to realize the human rights of all and to achieve gender equality and the empowerment of all women and girls. They are integrated and indivisible and balance the three dimensions of sustainable development: the economic, social and environmental.

As one of the participants, Iran pledged to carry out the 2030 Agenda. In December 2016, the Government of the Islamic Republic of Iran held a special ceremony announcing a national education initiative that was arranged by UNESCO office in Iran to implement the educational objectives of this global program.

Therefore, The President Rouhani administration designed its own educational plan called "The Islamic Republic of Iran 2030 National Education Act: Moving Toward Quality Education and Lifelong Learning," which has so far neither been approved by the Supreme Council of Cultural Revolution nor become law. [1]

Figure 7. UN sustainable development goals

1. https://www.yjc.ir/fa/news/6077568

Figure 8. Paris agreement Logo

Paris Agreement And Iran

Change (UNFCCC) dealing with greenhouse gas emissions mitigation, adaptation and finance starting in the year 2020.
The Paris agreement, empowering all countries to act to prevent average global temperatures rising above 2 degrees Celsius and to reap the many opportunities that arise from a necessary global transformation to clean and sustainable development.

As of October 2017, 195 UNFCCC members have signed the agreement, and 169 have become party to it. Iran has reaffirmed its commitment to the Paris climate agreement reached in December 2015.

The Paris Agreement's central aim:
-strengthen the global response to the threat of climate change by keeping a global temperature rise this century well below two degrees Celsius above pre-industrial levels and to pursue efforts to limit the temperature increase even further to 1.5 degrees Celsius.
-strengthen the ability of countries to deal with the impacts of climate change. To reach these ambitious goals, appropriate financial flows, a new technology framework and an enhanced capacity building framework will be put in place, thus supporting action by developing countries and the most vulnerable countries, in line with their own national objectives.
-Also provides for enhanced transparency of action and support through a more robust transparency framework.[2]

2. https://www.eghtesadnews.com/

Organizations Related To Sustainable Development

Department Of Environment

Figure 9. Department of Environment logo

A governmental organization, under the supervision of the president, that is responsible for matters related to safeguarding the environment. The realization of the fifth article of the Constitution of the Islamic Republic of Iran in order to protect the environment and guarantee the proper and continuous enjoyment of the environment in such a way that while preserving the balance of the biological relations leads to sustainable development and improvement, quality of human development.

Organization's basic duties:

-Protecting the natural ecosystems of the country and restoring the adverse effects of the past on the environment.
-Prevention of environmental degradation and pollution.
-Assessing the environmentally tolerant capacity for sustainable and sustainable use of environmental resources.
-Continuous monitoring of the exploitation of environmental resources.
-Active exposure to critical environmental environments involves contaminants exceeding the permeability of the environment.[1]

Green Management Association

Figure 10. Green Managment Association logo

One of the organizations that plays an effective role in sustainable development is the Green Management Association of Iran, a nonprofit and nongovernmental organization (SEMN), registered in the Iranian Chamber of Commerce, Industries and Mines, and registered by a board of directors elected by the founding board and its members, based on Specified and consolidated articles are managed. It considers itself to be a partner in manufacturing and service organizations to provide superior products and services that are consistent with environmental laws and practices, in order to develop the industry along with environmental and social responsibility.

The Green Management Society of Iran is considering recruiting in accordance with its articles of association in order to develop a convergent environmental accountability approach with the economic and social responsibilities of the organization as well as the possibility of sharing successful experiences through cooperative networks.

In partnership with internationally acclaimed organizations, it has developed collaborative efforts to develop knowledge of green management in international space

1. https://www.doe.ir

and the transfer of global experiences and the development and development of a methodology for green innovations.
Mission of the Green Management Society of Iran is Providing expert management services for green management to organizations in the country and region with a view to creating sustainability in the business environment through the integration of their social, economic and environmental responsibilities.[2]

CENESTA

Figure 11. Cenesta logo

The Centre for Sustainable Development and Environment (CENESTA) is a not-for-profit civil society organization that struggles to re-empower indigenous peoples and local communities in Iran and beyond (including indigenous nomadic tribes and coastal and marine areas) by promoting and supporting appropriate recognition of Indigenous peoples' and Community Conserved territories and Areas (ICCAs) that emphasize nature conservation, community rights and sustainable livelihoods. CENESTA also promotes democratizing agro-ecological research. CENESTA is a member of UNINO MAD (Union of Indigenous Nomadic Tribes of Iran), ICCA Consortium, IUCN and Global Forest Coalition. It is accredited to the 3 Rio Multilateral Environmental Conventions.

Cenesta has worked with the indigenous nomadic tribes and local communities of Iran for decades and has gathered information and many examples of best practices on a large variety of sustainable and effective governance systems for conservation of nature and natural resources practiced by them. Realizing the importance of governance diversity, Cenesta set up the workshops to be held at a critical time for Iran's official governance and management system of protected and conserved areas (PCAs).

Cenesta has also worked in conservation projects such as the Asiatic Cheetah Project (where it acted on behalf of IUCN Commission on Environmental, Economic and Social Policy—CEESP) and on the governance system of PCAs in Iran and other countries. It has also worked on marine, coastal and island conservation.

In the next section, we will introduce several influential Casestudies in the area of sustainability (environmental and social). In recent years, these Casestudies have had a significant impact on community,based on stronge advertising action, which has led to changes in public culture. we hope this kind of activies (govermental and private based actions) grow in following years and It will improve the current unfavorable conditions.[3]

2. http://www.iran-gma.com/
3. http://www.cenesta.org/en/

White Blue Co Space

Figure 12. White-Blue Office, Isfahan, Iran

White-Blue is a collaborative work space in Isfahan that provides a variety of services for entrepreneurs and creative people for development. The workplace is the basic service Blue-White offers for business development. People who have blue-and-white membership can reserve and use their work space whenever they want. This space meets the standard of professional space and provides a beautiful and efficient environment for work.

Blue-White has been designing workshops for users using its extensive network of entrepreneurs and mentors. These workshops will be held alternately alongside blue-white workshops and the network of colleagues. In the blue-white, there are minimal facilities for work including meeting rooms, internet, lounge, and snack bar.[1]

1. https://blue-white.co/

Tuesdays Without Cars

Tuesdays without cars is a campaign aimed at using less frequent one car user, at least on Tuesday, instead of using a private car, have more useful options such as biking, walking, using public transport and at least using a sharing car.Creating the vitality and health of citizens in the direction of developing healthy cities.

The development of walking and cycling culture as an efficient short-haul shift.Helps to reduce air and noise pollution, traffic congestion and damage caused by them, including diseases, accidents, social anomalies, deaths and so on.Decreasing single-engine vehicles and increasing the capacity of public transport vehicles and their service levels. Promote the role of public transportation and nutrition by pedestrians and cyclists. Household and household savings in fuel consumption and luxury spending.[1]

1. https://docharkhehmag.ir/

Figure 13. Tuesdays without Cars Poster, Tehran

No Plastic Bags

Figure 14. Advertising the non-plastic bags

In Iran, for several years now, the 21st of July has been declared as a day without nylon bags by Tehran municipality, and along with some non-governmental organizations in the markets and stores of the municipality, buyers have been supplied with degradable bags.

Perhaps the most important reason for using more nylon bags is their tiny price compared to fabric bags and paper, so the environmental organization suggested that the tax on plastics be applied and it was estimated that this would be up to 50 The percentage will reduce the consumption of plastics.But what's clear is that there needs to be a wider movement for culture in this area to bring down the consumption of nylon bags to an acceptable level.[1]

1. http://www.anreoalborz.org/new/index.php

Yooz

An electric car manufactured by an Iranian knowledge-based company will soon hit the roads, Iranian media reported. The two-seat electric car, named 'Yooz' (meaning cheetah in English), is produced by university-based firm Parax Co. affiliated to Islamic Azad University, Qazvin Branch. The Yooz car can travel at a speed of 80 kilometers per hour.

It can also hold 15 kilowatt-hours of electricity per 100 kilometers and it takes two and a half hours to charge. It is 1.3 meters wide and two meters long. Its small size should be an added advantage in the big urban areas with permanent parking problems. In the face of the grave dangers of air pollution that grips Tehran and other cities for almost the entire year, it has been promoting the use of hybrids and PEVs.[1]

1. http://www.youzkhodro.ir

Figure 15. Youz Cars Poster

3.State Of The Art: Education On Sustainability In Iran

The concepts of sustainability and sustainable development are the words frequently heard. In any areas, scholars argue that the main principle is sustainability and its values and principles must be promoted; from an environmental activist to the economist, from an engineer to a sociologist, all of them consider sustainability as a priority, although they have different perceptions of this concept and look at it from their particular perspectives. Beyond the differences between the analysts' viewpoints in various fields, it is believed that education is a main tool in order to introduce the principles of sustainability to individuals[1]. Actually, in the current era, there is a need to use effective strategies for sustainable development at national and international levels and there is a consensus that education is the driving force of this process.

Education can be considered as the cornerstone of sustainable development as the main component of sustainable development and the largest and most complex social system, which directly accounts for 15% of the state budget in Iran. Attention is paid to the characteristics, potentials and empirical and indigenous knowledge in the field of national sustainable development shows education is very important. Education can encourage students to be better citizens and to apply their knowledge in the solution of global issues.[2]

Iran's Higher Education and Sustainability

Realization of sustainable development requires role-playing of various institutions in order to promote and institutionalize the values of sustainability. One of the important actors in the pursuit of this purpose is universities. In general, sustainable development needs holistic people with systematic thinking, interdisciplinary, informed, creative and participatory insights and universities are the place for nurturing these individuals.[3]

Another function of higher education in promoting the values of sustainability is its role in providing social services. Achievements of university in the field of knowledge production is not limited only to students and it is important that other individuals who are not in classes and at university, can benefit these achievements. For example, universities can hold short-term training courses about different issues and provide their achievements to other people. If universities and higher education institutions do their duties well, it can be expected to shape knowledge-based society. This society has environmental, economic and social insight and knowledge.

In recent years, most of the universities among the world have taken concrete steps in this regard, but at the Iranian universi-

1.UNESCO. (2004). Education for Sustainable Development Information Brief. UNESCO, Paris.
2.Ferrer - Balas, D., & Muler, K. (2005). Enginering Education in Sustainable Development. International Journal
of Sustainability in Higher Education.
3. Mosaei, A., & Ahmad Zadeh, M. (2009). Development education and sustainable development. Journal of
strategy, (18).

ties, aside from some scattered efforts, the formation and development of activities related to sustainability were inadequate.

If the experiences of universities in Iran are reviewed, it will be found that, sustainable development based on environmental considerations, along with environmental concerns in the global arena, have been considered somewhat in the universities in Iran. For example, the establishment of the Office of Sustainable Development at the Amir Kabir University of Technology in 2011 and/or the measures taken in Sharif University of Technology, Iran university of Science and Technology and other universities or the global rankings of Zanjan University on indicators of sustainable development and holding numerous national and international conferences by the universities in Iran. But, it should be said that there have been very partial and sporadic efforts to develop the environment sustainably.

In Iran, the universities have not seriously addressed the social aspects of sustainability, the issues of equality, peace and just neither in terms of content nor educational and research programs. In recent years, some universities have taken some measures; at some universities have established some disciplines with interdisciplinary contents, of course, they are at the beginning of the way and these programs requires serious progress; they should be excluded from personal experience or intra-university mode and placed at the priority of policy-makers' planning.

The Universities promote their activities toward sustainable development. One of the main fields that promote a society toward sustainable development is "environmental engineering". According to the article 65 of 4th development plan of Iran (2005-2009), government is urged to prepare regulation regarding sustainable development path for all ministries, universities, and other organization. It will be a good chance for universities to enhance their activity for establishment of different related fields e.g. environmental engineering and science. The government is encouraging these activities in universities by introducing some University as "Green University". For example, based on AUT activities toward sustainable development, it was approved for this university to be "Green University" in 2003 by Iran Ministry of Science, Research and Technology as well as Department of Environment. Therefore, AUT as one of the main technical universities in Iran has chosen the strategy "pioneer of Sustainable Development in Iran" for the next decade[4] .

4. Alavi Moghadam M.R., Taher-Shamsi A., Maknoun R., Sotoudeh M., (2005) Approach in Education and Research toward Sustainable Development in Amirkabir University of Technology (AUT), Iran

Iran's Higher Education System

The history of the establishment of academic universities in Iran dates back to 1851 with the establishment of "Darolfonoon", aimed at training and teaching Iranian experts in many fields of science and technology. It was in 1928 that Iran's first university (The University of Tehran) was proposed by an Iranian physicist, Mahmoud Hessaby which was built in 1934. The main purpose of the establishment of the University was to disseminate advanced knowledge in relation to the sciences, technology, literature and philosophy.[1]

The first university of Iran (University of Tehran) started its activity by establishment of the following six faculties (History, 2006):
1) Theology,
2) Natural science and Mathematics,
3) Literature, Philosophy and Educational Sciences,
4) Medicine and its various branches,
5) Law, Political Science and Economics,
6) Engineering.

In 1934 only 40 students were admitted to the engineering faculties of the University of Tehran in the fields of civil engineering, mechanical engineering, mining engineering and electrical engineering fields. Since the Islamic Revolution of 1979 in Iran, the educational system of the country has gone under qualitative and quantitative changes.

The two Ministries responsible for higher education in Iran are the Ministry of Science, Research and Technology (MSRT) and Ministry of Health and Medical Education (MHME). Presently, 54 universities and institutes of higher education and 42 medical schools are active under the MSRT and MHME, respectively. In addition, Islamic Azad University; as the first private university in Iran, is presently active in over 110 cities in Iran with more than half a million students.

Higher education is offered at the following types of institutions:
-Universities:
General/Comprehensive
Specialized (fine arts, engineering, medicine)
Comprehensive Technology (applied sciences)
Payam-e Noor University (distance learning)
Medical
Private
-Teacher Training Colleges,
-Technical Institutes and Higher Education Institutes (non-university),

Public Higher Education In Iran

Iran's public universities have a relatively good reputation, particularly for undergraduate education in engineering. The University of Tehran is ranked by the Academic Ranking of World Universities as one of the top 400 universities in the world (301-400). Amirkabir University of Technology is listed among the top 500 universities in the same ranking (401-500). Sharif University of Technology has appeared on the list in previous years and is presently ranked by Times Higher Education among the top 600 universities in the world (501-600).

1. Arabi, Andas Mdandar. 2014. Privatization of Education in the Islamic Republic of Iran: One step forward, one step back.

Private Higher Education In Iran

By the end of the 1980s, an exploding youth demographic led Iran's government to reassess its prohibition on private universities, and in 1988, it permitted non-profit private universities to apply for charters to operate. The Ministry's website does not provide information on the number of institutions in the dynamic private sector, but some reports suggest a rapid increase from 50 private HEIs in 2005 to 354 in 2014, an increase of more than 600 percent in less than 10 years. The overwhelming majority of Iran's students are enrolled in the private sector. More than one third of all Iranian students attend the semi-private Islamic Azad University (IAU), Iran's largest university and simultaneously one of the largest mega universities in the world with 1.7 million students. The overwhelming majority of Iran's students are enrolled in the private sector. More than one third of all Iranian students attend the semi-private Islamic Azad University (IAU), Iran's largest university and simultaneously one of the largest mega universities in the world with 1.7 million students. [2]

Degrees And Qualifications

-Associate Degree (Kardani – formerly Fogh Diplom),
Kardani programs are presently offered as either five-year integrated secondary and tertiary programs or as two- to three-year postsecondary qualifications. Kardani programs entail the completion of 72-78 credits for graduation, with one credit being equal to a 45/50-minute class over one semester. Kardani degrees are awarded by universities, higher education institutes, and technical institutes. Kardani degree-holders have the option to complete a Karshenasi degree (the equivalent of a bachelor's degree in the U.S.) in two years.

-Bachelor (Karshenasi),
The Karshenasi degree is structurally similar to a U.S. bachelor's degree. Previously known as the Licence, the Karshenasi requires at least 130 credits at a university or other institution of higher education, and a minimum of four years of full-time study. Students must achieve a minimum grade point average of 12 out of 20 to earn the degree. Undergraduate curricula offer a wide range of general education and elective subjects along with the degree specialization, which typically is concentrated in the last two years of the program.

-Master's Degrees (Karshenasi Arshad),
Following the Karshenasi, the Iranian system has a postgraduate Karshenasi Arshad degree (previously known as Fogh Licence or Fogh Lisans). The award of the credential typically requires 28 to 45 credits, depending on the program, with an overall GPA of 14/20 or better, and the completion of a thesis. Programs are generally two years in length. These postgraduate degrees are referred to as "non-continuous master degrees" (Karshenasi-Arshad Napayvasteh) as opposed to "continuous master degrees" (Karshenasi-Arshad Payvesteh) found in the professions. (Additional detail below.)
NOTE: In recent years, there has been an increase of Western-style Master of Business

2. Malekzadeh, Shervin. 2015. The new business of education in Iran. Washington Post. 19 August.

Administration and Doctor of Business Administration programs offered by both public and private universities in Iran.

-Doctor of Philosophy (Doktura),
Doctoral degrees require the completion of 12-30 credits of coursework, a comprehensive examination, publication and defense of a research dissertation, and an overall coursework GPA of 14/20 for the award of the degree. Program duration is between three and six years.

Environmental Education In Iran

Environmental engineering program at graduate level have been developed since 1990 in Iran. At the present time, there are ten universities in Iran that are presenting environmental engineering program at the graduate levels. The numbers of graduated students of this field are dramatically increased within past few years. The environmental engineering education system of almost all universities in Iran is quite traditional and it should be modified in the near future according to the public needs and concerns.

It is no doubt that the traditional program of environmental engineering cannot cope with the complex nature of the present environmental problems of developing countries. The Environmental Engineering departments of Iran's Universities should modify their curriculum by adding several new and multidisciplinary courses in the near future. Several courses such as "Green Chemistry", "Energy Management", "Environmental Laws", "Environmental Economics" and 'Environmental Ethics and Philosophy", "Environmental Sociology" and "Sustainable development" are suggested to add to the curriculum of the all environmental enginering program as elective courses in Iran.[1]

multidisciplinary courses in the near future. Several courses such as "Green Chemistry", "Energy Management", "Environmental Laws", "Environmental Economics" and 'Environmental Ethics and Philosophy", "Environmental Sociology" and "Sustainable development" are suggested to add to the curriculum of the all environmental engine¬ering program as elective courses in Iran.

1.Alavi Moghaddam et al. /Environmental Engineering and Management Journal 7 (2008)

Major Course: (must be taken paased successfully by all candidates)

1.Environmental Planning and managment
2.Water Treatment
3.Wastewater Treatment
4.Air Pollution and its Control
5.Solid Waste Managment
6.Seminar
7.Thesis

Elective courses:
(To be taken according to the following four major area of intrest, with the approval of his/her superisor)

Water and Wastewater

* Water and Wastewater treatment Plant Design
*Physical, Chemical and biological Processes
*Industrial Wastewater Treatment
*Unit Operation Lab
*Water Supply
*Sanitary and Storm Sewer Design
*Land Application
*Water Microbiology

Water Resources

* Water Resources Development
*Groundwater Hydrology
*Advanced Hydrology
*Surface Water
*Pollution of Surface
*River engineering
*Water quality Managment
*Soil Pollution
*Remote Sensing in Environment

Solid Wastes Managment

* Collection and Transportation
*Qualitative and Quantitative
*Assessment of Solid Wastes
*Recovery and Recycling
*Composting
*Hazardous

Air Pollution

* Climatology
*Pollutant Emission Control
*Atmospherie Pollution Control
*Determination and Assessment
*Industrial Ventilation
*Noise Pollution

Table 1. MSc educational program of Environmental Engineering in Department of Civil and environmental Engineer

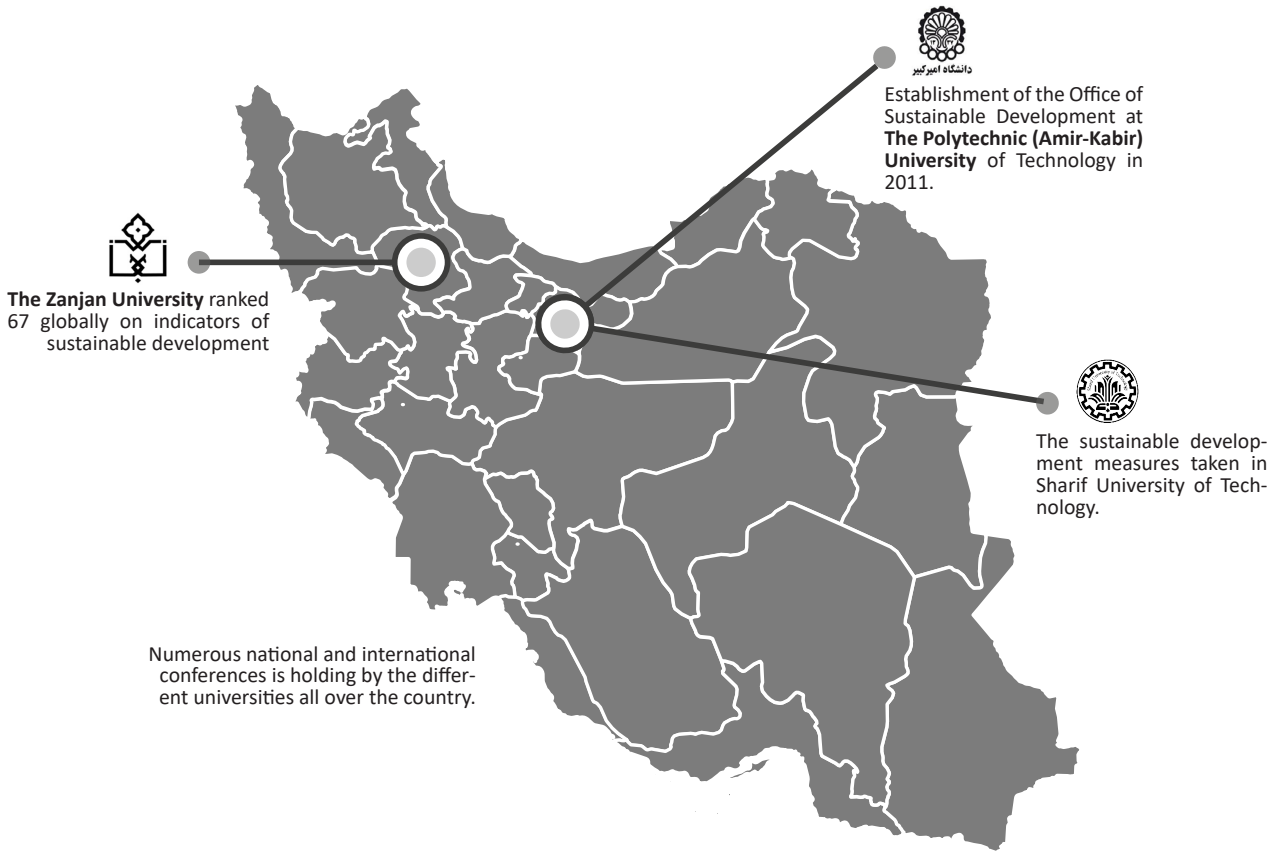

Table 16.Map of Activities of Universities related to sustainability

3.Overview Of Education On Sustainability In Iran's Design Schools

In last decades the research and application fields of design profession have widen so much as the definition of design as a discipline that concern the conception of industrial artifact appear not sufficient to describe a comprehensive profession.
One of the transversal and fundamental characteristic of this transformation has been the introduction of the concepts of sustainability and sustainable development into design project. The change has concerned also the design methodology, in the last years the attention has switched from the design of industrial products to the conception of articulated solution with the aim to fulfil the user's need and desire through the elaboration of integrated system of product and service.
Therefore, before observing the situation of Sustainability in Iran's Design Career it would be better to have an overview on Iran's Design position from past till today.

Brief History Of Art, Design And Industry In Iran

Iranian design has never been a recent or modern idea: "Design Thinking", a process shared amongst all kinds of design, has been around in Persia since ancient times. There is a huge number of artistic, industrial and architectural instances of invention and innovation, proving that the Persian (the Iranian) have been using the principles of good design in architecture, musical instruments, landscape, products, clothes, etc.:

Figure 17. Yazd's Badgir

For instance, "Ba'dgir" (a traditional wind structure used for passive air-conditioning of buildings in deserts), famous Persian/ Iranian Gardens (symbolizes the idea of an earthly paradise), Qanat (one of a series of well-like vertical shafts, connected by gently sloping tunnels as a reliable supply of water for human settlements and irrigation in hot, arid, and semi-arid climates).

Figure 18. Gonabad's Qanat

and "Giveh" (a kind of soft, comfortable, durable and hand-woven-top shoe) are just examples of using design thinking and sustainability principles in products and architecture when there have not been any forms of formal design education in ancient times[1]

Figure 19. Traditional Giveh

The first wave of modernization in Iran began when The parallel efforts of Pahlavis and Qajars in opening the country's doors towards the western and modern world resulted in a complete revolution in the country's traditional system of education. Accordingly, most of the modern art education methods are rooted outside Iran's borders.

Throughout the late 1960s and early 1970s, Iran was one of the richest countries in the Middle East, and it enjoyed a promising increase in cultural activity. The Iranian petrodollar bought the best of Iranian and Islamic artworks as well as some of the best contemporary art from European and American galleries. International art experts, curators and collectors flocked to the country, scholarships were established, festivals arranged, and galleries and museums opened. The Iranian art scene looked modern and competitive, and these boom years made the pioneers of contemporary Iranian art known to the world, with several international biennials awarding Iranian artists.

On the other side The second wave of Iran's industrialization and economic modernization began, numerous famous factories, like "Iran_National", "Arj", "Azmayesh", and "Ardel", were established to produce consumer goods (such as matches, sugar, textiles, glass, etc.) and durables like cars, gas-cookers, refrigerators, and fans.

Accordingly, a need for industrial designers who were, not only familiar with the industrial processes of manufacturing, but also aware of social and cultural contexts of Iran, was emerged by the industry to appreciate local needs and preferences of Ira- nian users. So, the 1st generation of Iranian industrial de- signers (E.g., Vazguen Minasian Filipos-shortly called "Flipo"-, employed by Arj Factory) were brought into the picture in this era to play their crucial role as the industrial and cultural intermediaries.

1. Sustainability Principles in Iran's Pre-Islamic Architecture/ Asiyerayat/ 2015/Azad University of Yazd

Current Status Of Design (Industrial Design)

According to a report by the Economist, Iran has been ranked 28th in annual industrial production growth rate in 2009. As this report shows the government of Iran has plans for the establishment of 50-60 industrial parks by the end of 2015. Iranian contractors have been awarded several foreign tender contracts in different fields of constructions, power generation, and gas, oil, and petrochemical industries. The availability of local raw materials, rich mineral reserves, experienced manpower have all collectively played a crucial role in engaging with the international offers.

The emergence of the academic education of industrial design in Iran is almost recent and followed by the growth of industrialization and economic modernization. The academic education of design was initially started at the University of Tehran, Faculty of Fine Arts, in 1969 and just some years later, design program was established at the Faculty of Decorative Arts; the present University of Art.

ID (Industrial Design) Education in Iran is an academic field, which is established since fifteen years ago. It has been taught in Bachelor and Master Courses in ten universities in Tehran and five other cities. All these universities follow the same plan and syllabus in Bachelor courses. However, the education of industrial design, as a distinctive division of design, was started at the Faculty of Fine Arts in 1983 and later in 1986, at the University of Art. Since then, many other state and non-state universities started to offer industrial design program at both undergraduate and postgraduate levels. Table 2 presents the universities at which Industrial Design program is being offered. Collectively, around 13 state and non-state universities offer the program.

Universities are not the only places that the educational materials for industrial designers are produced. Iran's industrial design also receives support from multiple sources including ID journals, portals, associations, events, awards, ID Weeks, Jam, talks, competitions and also the private sector: there are two major Industrial Design specialized journals in Iran: Dastavard and 4BAQ.

There are also a number of Iranian ID portals, claimed to provide the latest and the most relevant information in Persian to Iranian industrial designers. "ID Reporter" & "ID News" are two Tehran-based sharing platforms, respectively established in 2010 & 2007. They not only circulate information to a wider community of Iranian industrial designers but also they have instigated numerous initiatives such as "Design Workshops ", "Clean Earth Online Workshop", "Tehran Service Jam" and also "Tehran Sustainability Jam".

Diverse fields of design, such as product design, packaging design, jewelry design, interior design, transportation design, service design, interaction design, experience design, urban furniture design, industrial graphics and even brand design, attract Industrial design graduates. They work either as independent freelance designers or are employed by a design or manufacturing company.

Figure 20. Dastavard Magazine Cover Pages

LOGO	UNIVERSITIES	UG	PG
	University of Tehran	1983	1993
	University of Art Tehran	1986	1994
	Alzahra University Tehran	1986	2010
	Iran University of sience and Technology	1993	2008
	Islamic Azad University	1993	1995
	Tabriz Islamic Art University	1999	2005
	Islamic Azad Universty of Mashad	2005	-
	Amirkabir University of Technology	-	2007
	Isfahan University of Art	2007	-
	Kish Island International Campus	2007	2007
	Semnan University	2009	-
	Bu-Ali Sina University of Hamedan	2014	-
	Farabi International Campus	2014	2014

Table2. List of Universities with Industrial Design program

Situation Of Service System Design Education In Iran

According to the list of Programs (Table 3) that offered by Design Universities, there is no Service System Design program that formally holds in Iran. There are just a few professors who are working on Service-System Design within Product Design projects in last recent years. Mainly, Service System Design courses are being though as MA programs under a course named “human and design” which formerly was dedicated to Interaction design in few Design Universities.

Whereas Service System Design has not recognized by board Public in Iran it has been introduced to Iranian Design professionals so well. There has been a number of well-established Service System events in Iran and During the first National Service Design Conference in Iran in 2015, it is announced that the Iranian Association of Service Designers (IASD) will be established.

Tehran Service Jam

This event is organized annually with a single topic worldwide and simultaneously, in which participants, as multiplayer groups, design and prototype service within 48 hours. At the end of each meeting, participants submit their samples to the global website.

In Iran, this event is scheduled for two days. The general issue is introduced by the World Organization and the participants enter into the design phase according to the grouping conducted by the scientific team. The initial idea is to find a problem or to find a smaller theme for design. Then, design strategy, service design tools are set up to solve the real problem. The idea for the solution combined with the creation of prototypes, role-playing instead of real-life, storytelling and scenario-building, and other service design techniques go forward so that teams have a clear idea of their solutions and plans. The second day focuses on modeling the design and display of its results, which will be digitally downloaded on the central site "Terminal for the Services of 2016", and prototypes will be displayed at the venue.

Iran needs a great deal of service system design. Almost industrial production has been lost in the years after 2011 because of challenges and sanctions, or due to lack of modernization of production technology, it is subject to stagnation and danger of collapse. Iran's agriculture has no advantage in the hot and dry area of the Iranian plateau, except in several regions and several specific products. In this situation, most startups and most large businesses have a basis other than the product and the derivatives of oil. Certainly, in the coming years, companies that serve businesses will use service designers to create the best experiences for their users, employees, managers and their colleagues. Many businesses will be based on the identification of real human needs and organizational processes will be optimized.

Figure 21. Tehran Service Jam Posters

Existing Sustainability Design Courses And Teaching Methods

The author had made several interviews with authorities in different design schools in order to understand which type of courses related to Sustainable design is going on in Iran design education system. As well as explained throughout the following chapters the ongoing Sustainable related design classes do not formally teach the subject of sustainability in relation to the role of designer and what is going on the rest of world for this course. It is only the matter of time, that Iran finds itself more involved in global environmental trends and decides to take action from a multi-disciplinary perspective. But we cannot wait passively until this happens. while there are no classes that teach design for sustainability with a service-system level approach that has though in other countries. they mainly focused on primary levels of design for sustainability that the reasons we will be discussed in following chapters.

Bachelor (Undergraduate) Program, Environment Project Course

According to Educational Program of Bachelor of Industrial Design, which was approved in 1983 by Ministry of Science Research and Technology, it contains 135 modules which could be educated over four years. Twenty of these modules are related to Liberal Arts and one hundred and fifteen of these modules are related to design field, among these main courses there is a course named Environment Project that has been thought in the third year. This course the following subjects are focused: Environmental assessment, working environment design, living place design.

This course is re-related to other aspects of Industrial Design in terms of environment. The main vision of this course is the environmental design throughout two concepts of environmental design and also environmental psychology. The goal of the course is to teach environmental design and environmental psychology and introduce some effective ways to indoor /outdoor design for a human being, access to reliable and safe energy.

In this course, Assessment will cover both theoretical and practical aspects of student learning. students should evaluate some sampled places and make some design and present it as a final judgment and the objectives of the course are to teach some aspects of environmental design such as:
Environmental psychology, sustainable development, green design, environment and products, fundamental of human behavior in different places, safe community, Environmental analysis, people behavior assessment, evaluation of sustainable design, prototype making. some of the related approaches and attitude are focused on the following aspects: Environmental perception, landscape, safe communities, human-environment interaction. Educational media, Video Projector, material for prototype making and muck up are the materials that use in this course. Students are evaluating Short term projects, their' presentations, final judgment on the project.

Master (Postgraduate) Program, Sustainable Design Course

As shown in Table for Industrial master students, who take this course, it provides the

TABLE OF CONTENT OF INDUSTRIAL DESIGN PROGRAM Undergraduate	
The basic definition, and course outlines	Fundamental 1
The significance of environmental design	Fundamental 2
The selection of cases	Design cases
Environmental assessment and detail survey	Initial Env.Design
Environmental assessment	Initial Env.Design
Collections and correction	Evaluation of places
Env Psychology Models	Env. Psychology
Env Psychology Concepts	Env Psychology
Analysis of gathering data	Env. Psychology analysis
Significance and aspects	Sustainable Development
Env design and green design	Green Design
Practical projects	Applied design for Env
Assessment of Human bahavior	Human psychology
Community safety and security copes	Safe community
Projects assessment	Applied projects
Final assessment of students' projects and seminars	Students Reports

Table 4.Industrial Design Program (BC)
List of Content

TABLE OF CONTENT OF INDUSTRIAL DESIGN PROGRAM Postgraduate
Sustainability Design Basic Concepts
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Table 5.Industrial Design Program (MA)
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opportunity to experience how designers deal with sustainability issues.
This course aims to develop the students' knowledge and personal engagement towards sustainability issues in product design. The courses focus on identification of design crises that may occur when environmental requirements need to be jointly considered, and on the development of solutions that may 'solve' such crises. Topics include theory and methods of sustainable design, design for sustainable behavior, environmental assessment of product life cycles, product improvement strategies, green design, and eco-design.

Based on Course description and some interviews with professors and students, it was found that professors (mostly the ones who young and educated outside of Iran) put their effort to utilize sustainable design approaches which are more related to Product-Service system level. This shift from product-based thinking toward adopting more systemic approaches is due to their increased attention to the potential of social challenges (income generation, education, health problem and environmental crises) alongside technological interventions. However, most of these practices and system based approaches are still at the basic level of innovation without regular structure, appropriate methodology, and knowledge.

In this course, students required being provided with a different set of expertise. In particular human-centered design skills become crucial, they have to develop new ways of satisfying user's demands and continuously seeks environmentally new solutions by integrating social-ethical dimension of sustainability in a systemic way.

on basic theories, methodological tools and on practical examples how to apply the sustainability design. The candidate is able to reflect on responsibilities concerning sustainable development related to his/her future professional role as practicing designer or professional working with design(ers).

In following sections (See observation part in next chapter), we will take a closer look at this lesson to analysis current teaching methods and contents and be figuring out main weak points and impacts.

Other Design Related Sustainability Education

Master (Postgraduate) of Sustainable Architect

Sustainable Architecture is one of the seventh trends of the architect in Iranian educational system. The main goals of this program, on the one hand, endeavors to maximize use of natural environments and the use of the best and new technologies, on the other hand, endorses the use of appropriate resources, waste disposal, and environmental control. This trend is one of the latest trends at the national and international levels.

Distribution Of Universities

I have identified all Design (Art) universities which hold these Design for Sustainability related courses throughout the Iran and then by analyzing the location of these universities try to observe their concentration.

Tehran University of Art (Tehran, Iran)
-Faculty of Applied Art

This school was established in 1960 with the name of Faculty of Decorative Arts by Ministry of Art and Culture; and focused on applied arts, such as: Pattern of Fabric Texture, Printing, Decorative Painting, Pottery, Visual Communication and Interior Architecture. In 1991 when the name of Art Academic Complex changed to the University of Art, Faculty of Applied Art continued its activities in 3 majors: Music, Industrial Design and Handicrafts in BA level. Among the major activity of this school we can mention to the setting of PhD level in Art Studies for the first time in Iran. And also planning and initiating 3 new majors in BA and 4 new majors in MA level.

-Design for Sustainability related Courses:
Industrial Design (Bachelor), Environment Project (6 credits)
Industrial Design (Master), Sustainable Design (2 credits)

University of Tehran (Tehran,Iran)
-Faculty of Fine Art

The College of Fine Arts is one of the oldest, largest and most prestigious colleges of the University of Tehran. When it opened ov3. er seventy years ago, it laid the foundations for academic study in various forms of art in Iran. It was in 2005 that the Faculty of Fine

Arts was expanded and renamed to the College of Fine Arts consisting of the five schools of Architecture, Urban Planning, Industrial Design, Visual Arts, Performing Arts and Music, and a research institute entitled Culture and Arts. At present, the College of Fine Arts has over 110 faculty members. Numerous graduates and faculty members of the college are presently distinguished and well-known figures in the country, and in some cases, internationally.

-Design for Sustainability related Courses:
Industrial Design (Bachelor), Environment Project (6 credits)
Industrial Design (Master), Sustainable Design (2 credits)

Iran University of Science and Technology (Tehran, Iran)
-School of Architecture and Environmental Design

The School of Architecture and Urban Planning was founded in 1968. Blending the aesthetic/artistic considerations with scientific/engineering necessities, the School provides instruction in architecture, urban design, urban and regional planning, industrial design and building and environmental sciences. The Architecture and Urban Planning School at IUST, which was established in 1969, is one of the most active architectural colleges in the country. The School has been enrolling students in its industrial design major since 1994. With the approval of the Ministry of Research, Science, and Technology, IUST has been enrolling students for MSc in the (part-time) Industrial Design program since 2009. The college has five technical workshops and an architecture and urban research center.

-Design for Sustainability related Courses:
Industrial Design (Bachelor), Environment Project (6 credits)
Industrial Design (Master), Sustainable Design (2 credits)
Sustainable architecture (Master), Sustainable design and planning, Life-Cycle assessment mindset, Regenerative Design

Tabriz Islamic Art University (Tabriz, Iran)
- School of Islamic Design

Tabriz Islamic Art University was established in 1999 after the Supreme Leader's speech to the members of the Supreme Council of the Cultural Revolution regarding the importance of academic studies on Islamic arts. The university is aimed at educating students in different art disciplines, doing research on topics of Islamic and Iranian arts, providing artistic and scientific services, and making academic connections to other art institutions and academics around the globe.

-Design for Sustainability related Courses:
Industrial Design (Bachelor), Environment Project (6 credits)
Industrial Design (Master), Sustainable Design (2 credits)

Art University of Isfahan (Isfahan, Iran)
- School of Architecture and Urban Design

The University of Isfahan's Pardis University was founded in 1355 as one of the colleges of the University of Farabi with the aim of training a specialist in preserving the work of Ibn-e History and after the active cul-

tural revolution, he was covered by one of the faculties of the university art complex with undergraduate degrees. History of art, crafts, and painting has begun. In 1369, she completed her Master's degree in Architectural and Operational Management. In 2000, the faculty of the affiliated University of Art University of Tehran became a university degree in Isfahan and the Faculty of Architecture and Industrial Design.

-Design for Sustainability related Courses:
Industrial Design (Bachelor), Environment Project (6 credits)
Industrial Design (Master), Sustainable Design (2 credits)

International University of Tehran
(Kish Island Branch)

Kish International Campus was established in 2007 in order to facilitate the enrolment of foreign students. Graduates of the UT Kish Campus have the linguistic and professional abilities to function effectively in an international environment; the technical skills to operate in an increasingly complex technical world; the intellectual capacity and flexibility to adapt to constant changes and the leadership potentials to make the fullest possible contribution to the development of the community for the good of its people. In harmony with this mission, the University will select Iranian and international students who can succeed in harnessing diverse and modern academic and research capabilities. Through the development of strong scientific links with local and foreign educational and research institutions, the Campus continues to uphold the highest quality of both research and education. Efforts have been made for the Campus to remain at the cutting edge of science in different fields and to adjust its strategies to meet the market demands. The location of the Campus is the beautiful coral island of Kish, the Pearl of the Persian Gulf, with all its tourist and business attractions.

-Design for Sustainability related Courses:
Industrial Design (Bachelor), Environment Project (6 credits)
Industrial Design (Master), Sustainable Design (2 credits)

Urgent Need Of Designers To Change The Current Unsustainable Patterns

The design could be connecting the technically-possible to the environmentally-necessary and formulates new proposals –socially and culturally attractive- through the strategic coordination of Products, communication, and services.
Design can be seen as an asset into changing the whole field of services and their production into a more sustainable one. The design is usually already so multi-disciplinary process that new principles can be adapted relatively fast.
Design process already includes tools that help designers to find completely new and innovative solutions based on fuzzy concept search, service-focused design, and by for example studying the behavior of end-consumers and so forth.
'Design is going to have to become the front end of innovation. Designers are in a really powerful position because they have the tools and knowledge and power to turn it around

As Fabrizio Ceschin mentioned in his paper, enlargement of the design scope requires designers to be capable of addressing sustainability operating on the integrated system of products, services and communication through which a company (or an institution, NGOs) presents itself (Manzini, 1990; Meroni, 2008; Vezzoli 2007), creating clear, comprehensible and shared vision to orient innovation (Borja de Mozota, 1990), contributing to create relations between a variety of stockholders of value constellation (Zurlo,1990) and acting as facilitator to stimulate a strategic dialogue and eco-design process (Meroni, 2008).

In Uk has also been calculated that 80% of the environmental impacts of a product are embedded at its design stage (Ecodesign Your Future, European Commission - PDF, 1.6MB). But traditional design briefs are often inadequate when it comes to tackling real-world challenges. They may address cost and aesthetic, but pay no heed to a product's end of life or usefulness in the world.

Increasingly, however, new trends and disciplines such as service design are starting to address societal challenges such as food and water shortages, waste and aging, emphasizing the interconnectedness of human and natural systems and advocating a new approach to design practice and education. Sustainable design asks deeper questions about the purpose of a product or service, its place within a system and its impact on livelihoods and environments, and this

marks a departure from the more conventional focus on desirability or saleability
Findings showed that the emphasis on sustainability in design courses has increased over the last 10 years, and over 60% of courses do at least teach some principles or theory.
Unfortunately, according to my past knowledge and current findings, I have to note that, most of the Iranian Designers (Juniors and Professionals) are unaware and capable enough of this level of Design for Sustainability knowledge and criteria as well as available methods and tools yet (more comprehensively explanation in following sections).

In order to investigate the current status sustainable related courses in industrial design career of Iran, I decided to conduct a qualitative research in order to highlight some of the academic most relevant personalities' perspectives on the subject. In the next chapter, I will describe the methodology I used in the process of the investigation.

PART TWO: EXPLORING THE OPPORTUNITIES & STRATEGIC ANALYSIS

4. Analysis Iran's Sustainability Design Related Courses

As well as explained throughout the following chapters the ongoing Sustainable related design classes do not formally teach the subject of sustainability in relation to the role of designer beside available methodologies. It is only the matter of time, that Iran finds itself more involved in global environmental trends and decides to take action from a multi-disciplinary perspective. But we cannot wait passively until this happens.

As This thesis aims to explore the current state of Design for Sustainability Education in Iran's Design career, in order to have a deeper understanding of this status and to find opportunities for its improvement, Author decides to do more research on this area. To do so a series of actions were planned and organized as following 3 Methods; interviews with academic experts in the Sustainable related field, asking the questioner from students and as a final step attending to one of current sustainable related design course in postgraduate level.

Method 1: Interviews

The interview is a useful method that to provide a deeper understanding of social phenomena than purely quantitative methods, like questionnaires.It provides the opportunity to generate rich data that can then be analyzed in different ways. In this part, Interviews were conducted with three full professors who have well experienced on teaching Sustainability Design courses both in undergraduate and postgraduate degrees of Industrial Design program in Iran, in order to collect first-hand insights from them. The insights collected were used to define and gain a better understanding of the sustainable design situation, shaping the needs of the Industrial Design community and prioritizing the design work and understanding the main frustrations with the current situation and if they feel like anything is missing.

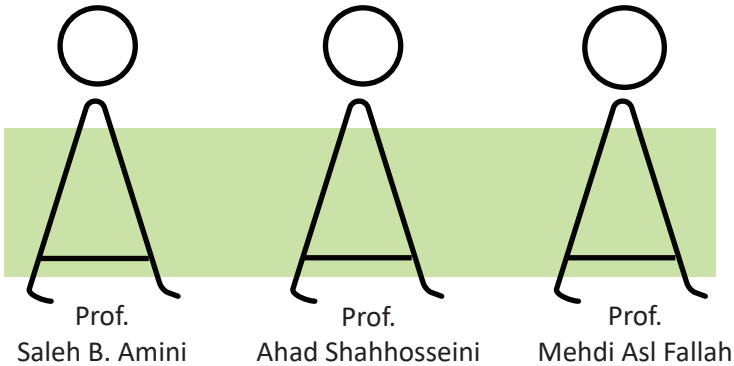

Figure 22. List of Interviewees

Structure Of Interviews

I targeted the following four academic professors as my interviewees, which are the Professor Mehdi Asl Fallah, who is the dean of the Industrial design in Art university of Tehran; the Professor Ahad shahhosseini, who is the full professor of Islamic Art University of Tabriz and he received his Master from Italy; the professor Saleh Baradaran Amini, who has several teaching experiences in service design field in different universities of Iran and finally Mrs. Sara Hatef; who has received her Master degree from Politecnico di Milan and recently became a professor in University of Art.

After analyzing the pain points that conducted by previews research, the following step was to investigate areas that weren't explored previously. were It being fundamental to define the goals of the interviews, decide the recruitment criteria and the questions before moving to the real interviews and collection of data. Every interview was held face to face (on by the phone call) and took 30 minutes. The interviews were semi-structured and followed a high-level discussion guide.

Table 6. Interviews schedule

Saleh B. Amini	Full Prof.	16/11/2017	Face 2 FaceT	ehran
Ahad Shah Hosseini	Full Prof.	25/11/2017	Phone Call	Tabriz
Mehdi Asl Fallah	Dean of ID	15/12/2017	Face 2 Face	Tehran

Saleh Baradan Amini:

1.Could you introduce yourself and your field of work?

I majored in Industrial Design and graduated from Polytechnic University of Tehran (Amir Kabir). I recently give up of the Ph.D. program in Higher Education Development to focus more on designing services and looking for adding knowledge outside of college.
During the past five years, I have worked as a service designer for many companies, including the Entekhab Industrial Group, Mahan Aircraft, the Ministry of Communications and Information Technolo-

gy, and Bardia Accelerator. I try to understand the real human needs and design services that respond to these needs well. I'm teaching design services in a variety of environments such as the University of Art, the Sharif University of Technology Entrepreneurship Center and the Neotek Lighting Center.

2.based on your experiences, how many percents of Iranian designers (students and graduated students) have enough knowledge about design for sustainable and use it in their projects?

As you know, in Iran, both in the bachelor and master of industrial design we have some courses associated with the concept of sustainable design, but, in my opinion, very few of current graduates and students are aware of the essence of this course. Currently, only 20% of real designers who are working in this field are informed well and half of them do not have the knowledge about all the levels of this area and i believe just 1% of their projects implement on this subjects.

3.What do you think of the main reason for not paying attention to sustainability education in the Iranian design education system?

In my opinion, there are fundamental challenges in this regard. Our education and training system is not designed properly. Our current system does not engage with issues and crises of the day. Unfortunately, we are only witnessing the fact that in some universities these issues are generally mentioned. In general, due to the fact that the design education system was designed around 20 years ago and has not been reviewed so far, the basic priorities in education have been neglected and the status of Sustainability Design is not clear.

4.In your opinion, why do our educators and professors focus more on sustainability on issues like green design or clean energy, and do not endure efforts to promote new relevant strategies?

Because these topics have been discussed and discussed in more community. And the professors of the Industrial Design community only have enough information on these subjects and prefer to stay out from social and economic dimensions that are more complex and less dominant. Perhaps the reason is lack of an educational

framework that is suitable for both faculty members and students.

5.What do you think is the most important need among our designers in related to promote Sustainability Design?

We need to change the design of industrial design as a whole and involve the designers in real. What's happening as industrial design is more closely related to handicrafts such as furniture design, jewelry and decoration, which does not have a profound effect on improving the existing conditions and the problems involved. In this case, the feeling of interaction is urgently needed. Presenting valid sources and connecting with foreign design communities and motivating designers is critical in improving and changing the current situation.

6.as a professional Iranian designer and tutor, what is the most influential method of promoting sustainability design among our designers?

Undoubtedly, changing the vision of Iranian designers from product-oriented to system service thinking is the most efficient way, which is a challenge that is very difficult because this methodology has been rooted in our society for many years. So there should be a way for designers to improve their understanding of how to solve problems, interaction and with the use and identification of foreign design communities.

Ahad Shah Hosseini

1.Could you introduce yourself and your field of work?

I received my Ph.D. in Sustainability architecture from Istituto Europeo di Design in 2012. Then I came back to my country and my city Tabriz in Azerbaijan province (Turkish part of Iran) and became a full Professor in Islamic Art University. I have experience in teaching master programs in both Industrial Design and Architecture Design. As Sustainability is my main major field, in recent years I tried to develop and promote this subject among the new generation of our designers.

2.based on your experiences, how many percents of Iranian designers (students and graduated students) have enough knowledge about design for sustainable and use it in their projects?

I believe that our current designers do not have enough information about main topics of Sustainability design. And they do not even have the basic level of this knowledge. At present, students are more likely to think of sustainable design related to architecture major, as subjects as Landscape design and Urban Design

3.What do you think of the main reason for not paying attention to sustainability education in the Iranian design education system?

In my opinion, it is necessary for them to be taught before entering in the Design academic environment, for an instant, when the student is prepared for the entrance exam of the university, the basic materials are taught to them then complete it in postgraduate education.

4.In your opinion, why do our educators and professors focus more on sustainability on issues like green design or clean energy, and do not endure efforts to promote new relevant strategies?

It can be noted that the present professors themselves also have little knowledge of these topics. There is not enough research and research unit in this area. In some cases, designers who graduated in higher education at the Assistant and Ph.D. levels provide students with a series of training and materials on an environmentally-friendly design that is close to sustainability design subject, which unfortunately often these practices are just theatrical and you can see usability of them on real case projects.

5.What do you think is the most important need among our designers in related to promote Sustainability Design?

In our design education system, the existence of a sustainable design course is a contradiction. All the dimensions of sustainable design must be applied to all design projects, and the universities must convey these discussions in their 8th or 6th-grade curriculum.

6.as a professional Iranian designer and tutor, what is the most influential method of promoting sustainability design among our designers?

We need to propose a solution that will make sensibility for students and designers. The designer needs to face environmental, social and economic problems in every field, and to come up with innovative solutions to improve them. In fact, we need to introduce awareness in the public domain, but not only the designer, all responsible and interested people.

Mehdi Asl Fallah

1.Could you introduce yourself and your field of work?

I obtained my master degree from the University of Tehran in Industrial Design field. Now is Head of Industrial Design Department in Art University of Tehran and also a vision creator and University lecturer for another university such as University of Tehran (Kish Island Branch). I have several research and papers related to eco-design and green design and relation of these topics on Furniture design. Beside my academic career, I am the founder of Honor studio in Tehran in 2009, mainly this studio provides decoration consultancy service to customers and also working with other decoration companies to implement their design ideas. In recent years we have added Jewelry design part to our Studio and try to educate designers with new methods of this field

2.based on your experiences, how many percents of Iranian designers (students and graduated students) have enough knowledge about design for sustainable and use it in their projects?

As you know, in some Iranian design universities we have undergraduate and postgraduate courses in industrial design include such as environmental design and the optional course of sustainable design, but the problem is that these lessons only deal with general topics that even a normal person (Non-designer) is also familiar with the subject, so I do not think that these lessons help us to increase our students' academic level. And only a small percentage of interested students in side studies and the use of external resources

have added to their knowledge.
3.What do you think of the main reason for not paying attention to sustainability education in the Iranian design education system?

There are many reasons for this, but if I briefly describe it, the main problem in planning the syllabuses of these courses is that it has been left unchanged for many years without any updated knowledge. The first step is to synchronize these lessons with the worldwide inspiration from other leading countries and to reorganize these courses according to the needs and problems of the country.

4.In your opinion, why do our educators and professors focus more on sustainability on issues like green design or clean energy, and do not endure efforts to promote new relevant strategies?

Well, this is an important weakness that exists in our educational system, the weakness that our own professors are aware of, but not an attempt to improve these conditions. The concept of sustainable design discourse has not been institutionalized, and even the government has not yet taken action to resolve this issue today.

5.What do you think is the most important need among our designers in related to promote Sustainability Design?

In my opinion, the most important principle is to eliminate the qualitative and scientific level of the college, in the direction of which students and designers are encouraged to acquire such knowledge, and the next is the activities of the government to universities to solve such issues.

6.as a professional Iranian designer and tutor, what is the most influential method of promoting sustainability design among our designers?

The designer needs to face environmental, social and economic problems in every field, and to come up with innovative solutions to improve them.

Method 2: Questioner (survey)

When re-designing an existing service, it is important to understand well about current users, collecting opinions and extrapolating insights from the research. User questioner can shed light on latent needs that the service is not meeting, opening up possibilities for implementation. It also illuminates how users behave and think about the system. From user questioner once can extrapolate the context of how the service fits and is used in their academic lives.

Moreover, it can be a way to understand the current tasks and activities that users perform to achieve their goals, the mental model they have, so how users think about the activities and expectations they have about the system. Especially for this project, it can help us to understand the level of awareness, problems, and frustrations with the system, features that are missing or disliked. In the end, if you don't understand for whom you are designing, it's hard to design the right solution therefore, the questionnaire was structured in the following three sections:

1.Background of the respondent in this section, the following 3 items were presented in order to ask the respondents for the basic specifications: gender, level of educational degree, and which field of design they were studying.

2. The second section of the questionnaire which is, in fact, the main section, used in the present study consisted of 6 items aimed to investigate the awareness of the main subjects. Level of awareness and understanding about the topic of sustainable design Since the subjects of the study were all directly involved in general knowledge about sustainable development and design for sustainability? Importance and necessity of the existence of this kind of course in the Industrial design field? Which topics mainly thoughts by professors for this course in their universities system (related topics)? Awareness about the recent methodology and tools that applied for this course in the rest of the world? Knowledge level of professors in related topics? awareness about recent activities (design for sustainability-related) done by government and other organizations?

The last section of the questionnaire, consisted of 5 items in order to investigate the percentage of applying the studies about sustainability on personal and work experience projects? Additional study about this topic? Which resources used to obtain more information? preferred language for additional study? And what is the effective way to gain more about the topic?

Having finished developing the questionnaire, it was randomly given out to 65 students in the industrial design field. Due to the low level of participation among Iranians, unfortunately, 16 subjects did not participate in the research and the researcher collected back only 49 questioners. To start analyzing the data, the collected responses were turned into numbers in order to determine the Mean and Percentage of each item under study.

Data Analysis 65 sets of questionnaires were hand delivered and mailed, then 49

responses were received. The response rate of 68.5% is good. It is concluded from the present research that most respondents who were female, had the undergraduate level degree and studied Industrial design.

The following table is the analysis of the data collected from respondents on the second and third sections of the questionnaire about the level of functionality implementation of the sustainability design in industrial design in Iran higher education system.

Based on the abovementioned finding it can be concluded that awareness about the sustainability in general, among the students of industrial design is average. But the majority of them perceived the importance of sustainability and necessity of it in Industrial design field. They believed available methodology and materials are almost related to the topic and need to be improve same as other cases in the rest of the world. On the other hand, the high number of the students agreed that the knowledge of experts and professionals in this category is not high and more consideration have to be apply on it.

Meanwhile, minority of students follow the news and heard about the activities and implementation of governance around sustainability and design filed, however according to previous authors findings recently there are some proper activities in this area. In terms of applying the studies about sustainable design in real work and projects, it shows that the high number of students put their efforts to obey and apply it.

Fortunately, most of the students passionate about gaining more information around the topic, in this regard they preferred use website and online resource while the English language is preferred, this shows that the level of English knowledge between ID students is higher than average. it is worthy to maintained her that more than half of the students believe that individual learning is the most effective way to obtain more knowledge on the top of sustainability design.

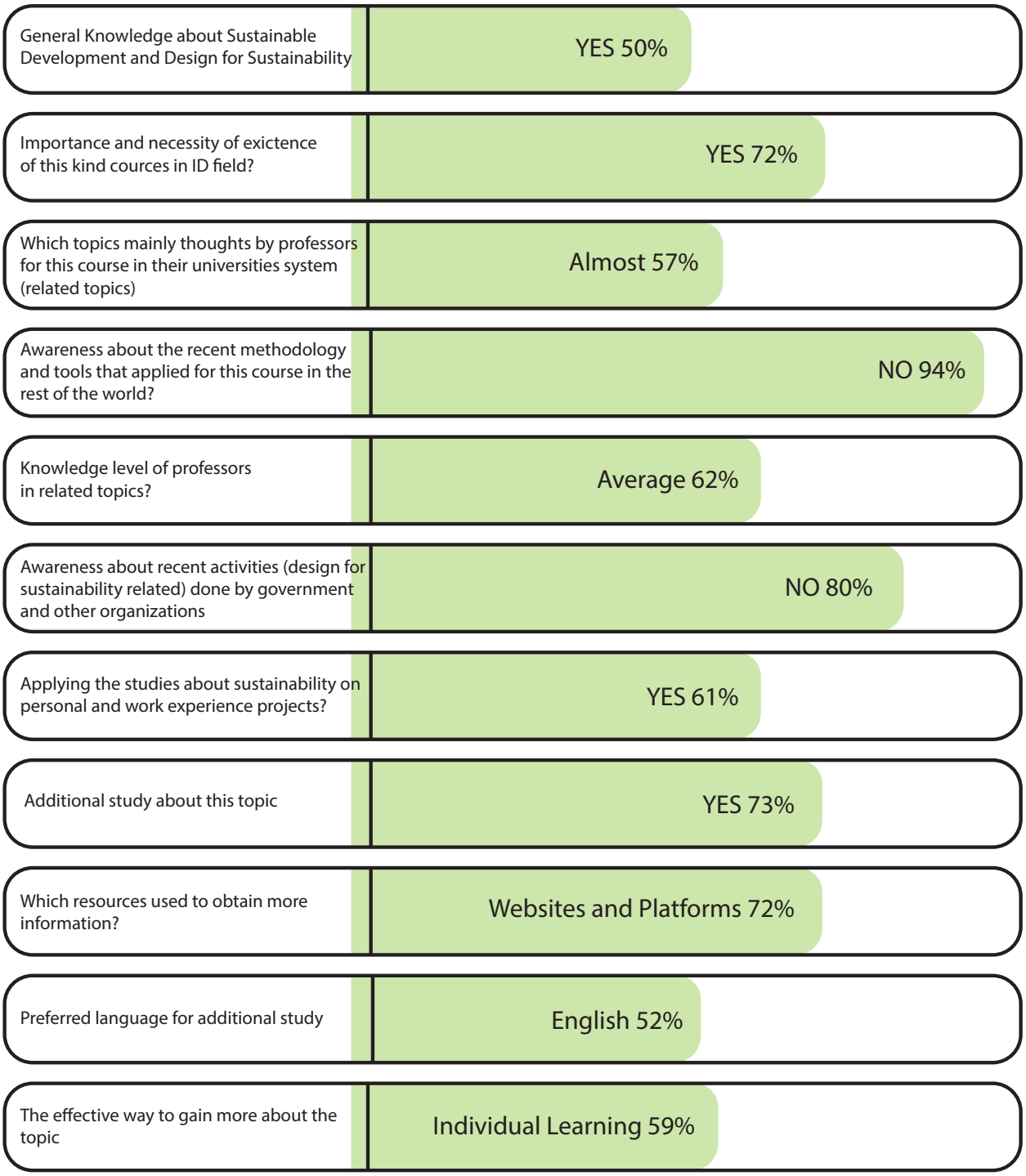

Table 7. The Questioner Result

Method 3: Observation

Observing The Ongoing Sustainable Related Master Course

As a third step, she decided to contact to the Dean of the Industrial Design Department of the Art University of Tehran, Prof. Mehdi Fallah. To request for the permission to attend as a mentor in one of current elective ongoing master course which is related to Sustainable design.

By his agreement, I was introduced to educator of the course, Sara Hatef, who has also graduated from PSSD of Politecnico di Milano on 2015. as she explained, she had some experimental experiences on teaching sustainable system related courses in some well-known universities of Tehran and other cities of Iran before this course, moreover, she has been the coordinator of two service and sustainable Jam events in Tehran and Isfahan during the last years. Recently she became a permanent professor in Art University of Tehran and was asked to teaching this course based on fixed course script, but based on her insights and knowledge that she has got during her master studies, she put her effort to make some changes and adoptions based on product service system thinking strategies for this course and try to introduce students what exactly is the real sustainable related design courses.

Although as she mentioned and author will explain in next part, about what she was finding out and observed from this course, these change and implementation are not easy to be done and some serious actions need to be applied on the whole industrial design career education system. To understand more about this situation, she asked me to join the course and observe the practices and methodology that she use in person for these class.

The course which is named Sustainable design is carried on Master degree of Industrial design and was scheduled offered in 23 hours in 15 weeks (1,5 hours per week). Approximately number of students limited to 15 due to a limitation in acceptation for elective courses. Most of the students had Industrial design background on their graduate degrees and few of them were from graphic or interior design.

The course structure was following the same methodology that has introduced in previous chapters. However, Sara was tried to lead the attention of her class focusing on the main environmental crises of Iran, for this reason, water challenge has been selected by students as the main issue to be considered as a subject of their projects. In the first session after a preliminary introduction about the state of water challenge by an educator, of course, she asked students to complete their basic knowledge around this issue and try to open their minds through it, finds out the most activities that carried on by global and internal organizations. the class divided into 3 group of 5 persons and started their collaboration on the project as we said in these course students required being provided with a different set of expertise. In particular human-centered design skills become crucial, they have to develop new ways of satisfying user's demands and continuously seeks environmentally new solutions by integrating social-ethical dimension of sustainability in a systemic way. meanwhile, in further

sessions, Sara explained and introduce the MSDS method, what is it and how to apply it with sustainable design dilemma, which steps that students should be taken and how to apply this methodology step by step on their projects. She explained the steps in the following order; 1. strategic analysis 2. exploring opportunities 3. system concept design 4. system design (engineering) 5. communication.

Therefore, after generating some ideas and find the perfect final concept in following sessions groups improve their ideas by having regular revisions with educator and get her useful feedbacks that guided them toward correct way. beside group working, Sara has asked some external educators and researchers who have related background on this topic to have some short presentation for the class.

In the processes of the project, groups had to have a simple prototype of their concepts and tested them by the real user to find out the weak points and solve it through what they learned from her lectures for the final assignment.

After two months of disciplined hard work and practice, the time for assignments arrived and the groups should have prepared their prototypes plus 20 min presentation, in this presentation they discussed and explained their project work in the following order, show what is the primary concept and how they developed it to this level? What was their value proposition? who are the targets and how they solved their demands? Which tools helped them more in these process? Who are the main and secondary stakeholders in this project? and also explaining the business marketing part of the project.

Figure 23. Master Class on Sustainability Design

Top Findings From Research

The following section presents the interviews, questioner and ongoing course observation results that according to the above structures and could be divided into three parts: the status of sustainable design in industrial design education system, the challenges for diffusing sustainable design in Iran higher education system and the future possibility of developing new agenda. And the outcomes represent all challenges and problems in the way of creating new agenda and strategies in order to diffuse Design for Sustainability n Iran Industrial Design education system.

Introducing other dimensions of sustainability (social and economic) and not focus on Environmental aspects.

One of the main limits encountered throughout the work that it was hard to apply the sustainable product Service-system (PSS) approach suddenly into industrial design system because Iranian designers are not capable of addressing sustainability operating on the integrated system of products, services, and communication.

One of the main limits encountered throughout the work that it was hard to apply the sustainable product Service-system (PSS) approach suddenly into industrial design system because Iranian designers are not capable of addressing sustainability operating on the integrated system of products, services, and communication.

The role and duties of sustainable designers while they encounter with environmental issues is not clear and well estimated according to the current undeveloped learning system.

According to observations current industrial student's minds stocked on generating the solutions just by creating new products as an individual element, this means they are not able to think in a systematic way for solving their issues.

Learning Sustainability needs radical innovations, and it argues that Product-Service System (PSS) innovations represent a promising approach to steer the current unsustainable production and consumption system towards sustainable ones.

Most of the available design for sustainability methods and tools have been developed in western Europe, based upon European experiences. However, because of characteristics of the local needs and product innovation approaches in Iran is different because of specific local social, economic and industrial development aspects.

The author found that there is limited academic research and evidence of impact created by design for sustainability, which could not provide sufficient resources, methodology, and structure for Iran's industrial design system.

Current industrial design education system in Iran is the more limited concept of

Eco-design or Design for the Environmental issues, however, we have to link to wider concepts such as sustainable product-service systems, systems innovations, and other life cycle based efforts.

Based on understandings from Iranian education system, Eco-design evolved to encompass broader issues such as the environmental and social component of sustainability and the need to develop new ways to meet consumer needs in a less resource intensive way and goes beyond how to make a 'green' product on a systematic level.

Is it obvious that is because of limited knowledge about Design for Sustainability also in academia among the educators and professors in this field.

On the other hand, all the available resources, methods, material and tools related to learning Design for Sustainability are available in other languages and not proper for Iranian students.

Help to change current unsustainable consumption and production patterns.

Achieving sustainability requires a process-based multiscale and systematic approach to planning for sustainability guided by target instead of traditional goal-based optimization.

It should be said that there have been very partial and sporadic efforts to develop the environment sustainably by universities of Iran.

The universities have not seriously addressed the social aspects of sustainability, the issues of equality, peace and just neither in terms of content nor educational and research programs.

It is no doubt that the traditional program of environmental engineering cannot cope with the complex nature of the present environmental problems of developing countries. The Environmental Engineering departments of Iran's Universities should modify their curriculum by adding several new and multidisciplinary courses in the near future

5.Discussion And Ideation Session

Ideation, here you'll make sense of everything that you've heard, generate tons of ideas, identify opportunities for design, and test and refine your solutions" (IDEO, 2015).

From the research and inspiration phase, a lot of information and ideas have been collected. To move on with the process has been helpful to organize this big amount of data and information in a manageable way, reducing the findings to a list of principles and areas of interventions. In this order, the most interesting one has been organized and shared with colleague's designer in a short discussion session in order to gain feedback, opinion and trigger discussions for the ideation phase.

This short discussion session was organized in the Art University of Tehran, in Industrial Design Department, conducted by me and attended by three colleague's designer, who were industrial design graduated students which their theses were most relevant to the subject of my project (their projects are available), in order to validate the findings and define a possibility to creating a path for upgrading current state and diffusing Design for Sustainability through it. The discussion session was planned to keep in mind the goals that we wanted to achieve, in order to guide the members through a some of activities and discussion was planned and organized ahead of time.

Table 8. List of Colleagues

Mina Mehrparvar	Art Uni of Tabriz	2016	Looking at Sustainable Tourism strategies
Mohammad Amin	Art Uni of Tehran	2016	Use of solar passive architecture as a design element
Hana Baghaei	Alzahra Uni	2017	The strategy of ID in the process of designing environmental products

The Structure Of The Discussion And Ideation Session

As a starting point, a brief presentation of the project and the work done till now has been shared (Research Outcomes). The aim was to give all the members a clear data, giving as many information as possible without overwhelming them. It has to be remembered that all of the members have a design background and used attending to Sustainable related courses.

During two hours we tried to discuss different ideas, running quickly through a variety of topic in order to validate the feasibility and appeal of them without focusing too much on the details. The team was guided through a process of divergence-convergence.: The idea underneath the process has been opening up the possibilities, creating as many ideas as possible; successively selecting one of those ideas and narrowing down to a more detailed.

The discussion has been divided into two activities that had the aim to guide the team through a process;

1.Brainstorming

Brainstorming is a method that the participants generate as many ideas around a topic as possible in a limited amount of time. its open up the possibilities and is focused on framing and setting the bounds of the ideation space. It is important to foster the spark that produces a large and diverse set of ideas. the group brainstorming inspired new ideas and discussions.

2.Idea Refinement And Wrap Up

Then the participants had to pick ideas and dives deeper into the concept. The aim is to select the most promising concepts and refine them. creating a more detailed idea, defining the main challenges, needs, and approaches to diffuse DfS in current state and finding the possible solutions. The goal is to improve a strategy by thinking through various alternatives. Then as a final step, the most feasible idea and the idea that is more meaningful and valuable selected.

The Ideas of participants about these topics were divided into 3 section; existing curricula, resources and teaching materials and finally the ability of the relevant educators. Each of the participants provided their ideas and practices to improve the status quo and also to help distribute the design issue for sustainability, which we will see the result in the next section.

Discussion Session Output

The ideas produced during the discussion session allowed the collections of insights and pointed out areas of interventions that the author and other colleague designers considered to be most effective in the way of raising the awareness and interest about design for sustainability among the students and opening up dialogue and confrontation.

Through the inspiration section focus on the challenges that we have on the way of creating new path and strategy in order to diffuse Design for Sustainability in Iran Industrial Design education system and explore some possible areas where to overcome these challenges with the old system and suggest some directions for future development, the result of these process is presented in this section.
A summit of the most interesting ideas created during the discussion was presented in a simplified way, following:

Making the strategies to implement and promote system innovation in initiatives offering a mix of products and services based on a network-structured and locally based model.

learning Materials and tools should be teaching in the local language (Farsi/Persian) to understand better and use of regional examples as Iran needs are different and more immediate.

Empowering teachers Concept and facilitate the matching process between professor and student.

Provide more guidance and support for the teacher's professional growth, allowing them to share materials and resources and mentoring new arrivals.

Rich media contents and selection of materials such as videos, articles, platforms, website, and quizzes from real-world sources or produced by expert teachers, to enhance discussion and practice the knowledge of the students through fun and challenging activities.

The courses content and the other materials should be present simply linked to wider concepts such as sustainable product-service systems, systems innovations, and other life cycle based efforts.

Set up the academic research unit in Design for Sustainability field, activating research projects and practicing methods, in order to develop visibility and discussion in this field.

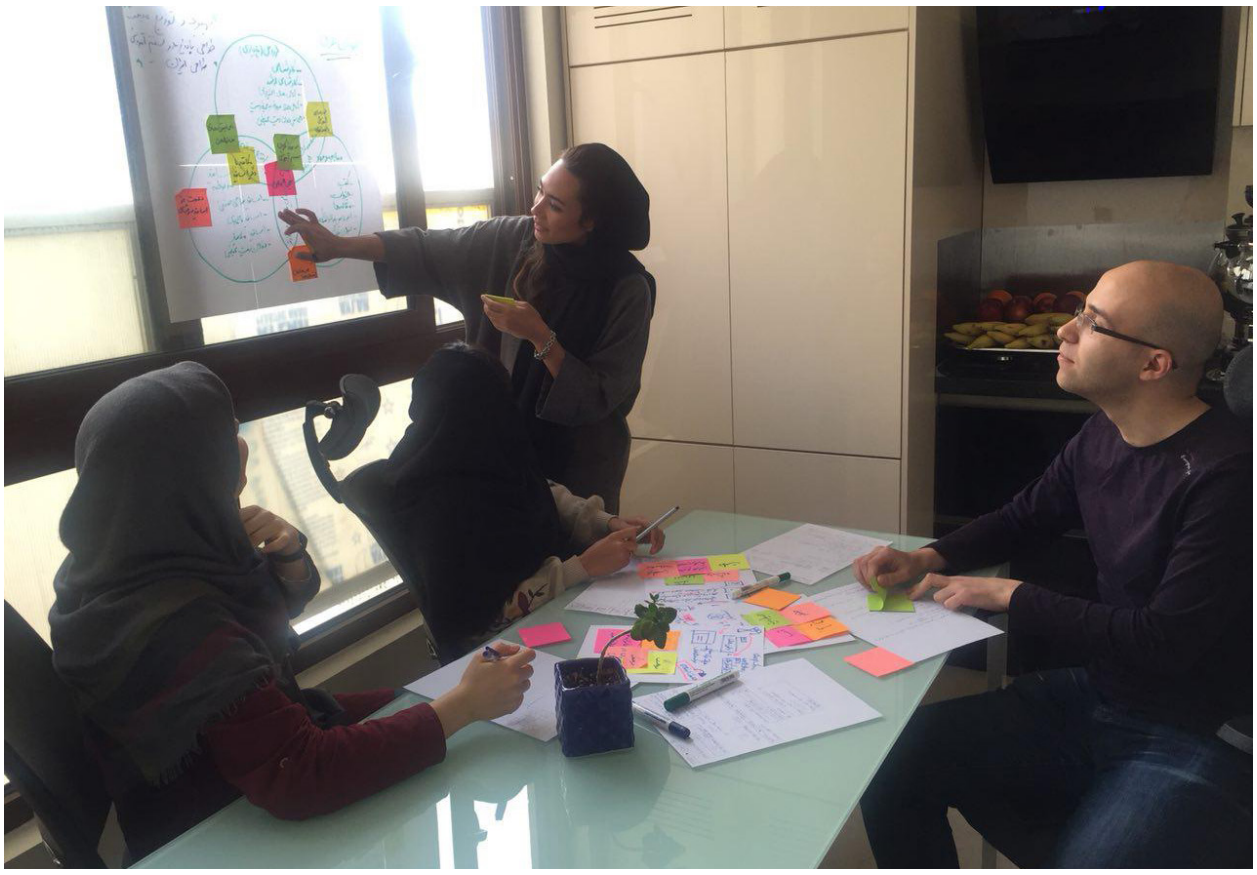

Figure 24. Discussion Session with Colleuges

The academia could develop exemplary projects to create momentum with local government as well as use cases to solve sustainable governmental issues.

There is also evidence of the need for a better communication capability between Iran academic and international ones, to create more possibilities and effectiveness of projects.

Achievements of the university in the field of knowledge production on Design for Sustainability agenda is should not limit only to students and it is important that the educators and professors and also other individuals who are not in classes and at university, can benefit these achievements.

Adapted the Design for Sustainability for Iran on the local aspect to make it more appropriate for the regional context, establish collaborations with other sustainable related fields, this could happen by organizing short-term workshop with the other (non-design) universities.

Redesign focus instead on new product design. 'Eco Redesign' approaches match well with the general level of innovation (incremental) and product development know-how in Iran and should strongly focus on redesign options and improvement directions.

Sustainability needs to be integrated as a critical lens in design, incorporating into the compulsory modules of a course, not to be considered as an extra-curricular concern, or as an elective course.

PART THREE: THE PROPOSAL

6.The Strategic Path & Open Learning Packages

Since the emersion of the environmental issues in Iran, it is useful to trace briefly some fundamental dimensions in the ongoing interpretation of sustainability by the design community, in order to gain a better understanding of the (potential) role of design research, education, and practices in relation to sustainability.

During the Disscussion session, the participants discusses current debates on Design for Sustainability, Product-service Systems and intercultural design approaches in Design Education System of Iran. The main goal is to bring together teachers, reserachers and students of Design area mainly Industrial Design students in order to share strategies to promote Design for Sustainability through design researches and projects activieies. In fact, it is what we refer to as Design for Sustainability which has four dimensions: selection of resources with low environmental impact, Design products with low environmental impact: System design for eco-efficiency, Design for social equity and cohesion. it is important again note that Current Design Education System of Iran is still unaware of these sustainability knowledge and criteria, as well as available methods and tools.

All these goals could be developed as a strategic path that widening the boundaries of the Design for Sustainability and consists of several applied steps which some are merely organizational or bureaucratic while some others present an innovative radical change with respect to current teaching techniques and education system policies in Iran. Designing this path aim at developing and diffusing Design for Sustainability in design schools in a transcultural perspective, where design researchers/educators share knowledge and come out with a design education agenda able to respond both local and global sustainability challenges.
Many actions could lead to fulfillment of these goals. We have chosen to introduce LeNS Network and joining into it as the starting model to base our strategy in. the previous success of LeNS project and its quick international expansion, as well as the ethos in which it is based, provide the best framework for us to make a starting contribution for the radical change that needs to take place in the Iran Design Education System.

In order to create a Network of Design for Sustainability in Iran, we will need to create a vast net through the support of, as many Universities as possible, throughout the country. This will be a process where communication and negotiations will need to take place and where timing is hard to determined.

To complete the implementation of this Strategic Path and as a central part of the process, we could develop the project by designing the Open Learning Resources packages and first apply it on LeNS Iran platform and then an immediate insertion in existing courses and gradual creation of more formal classes on subject. This open learning package allows a decentralized and collaborative production of knowledge produced as learning subsides. It can be described as modular e-packages of teaching materials (texts, Slideshows, tools, etc.) for designers, the all interested designers will be able to download free of charge, modify, remix and reuse. This part of process foresees the development of new curriculum for both Undergraduate and Postgraduate level of Industrial Design Program in Iran. It takes consideration to respond to local needs and demands in economic, social and cultural levels.

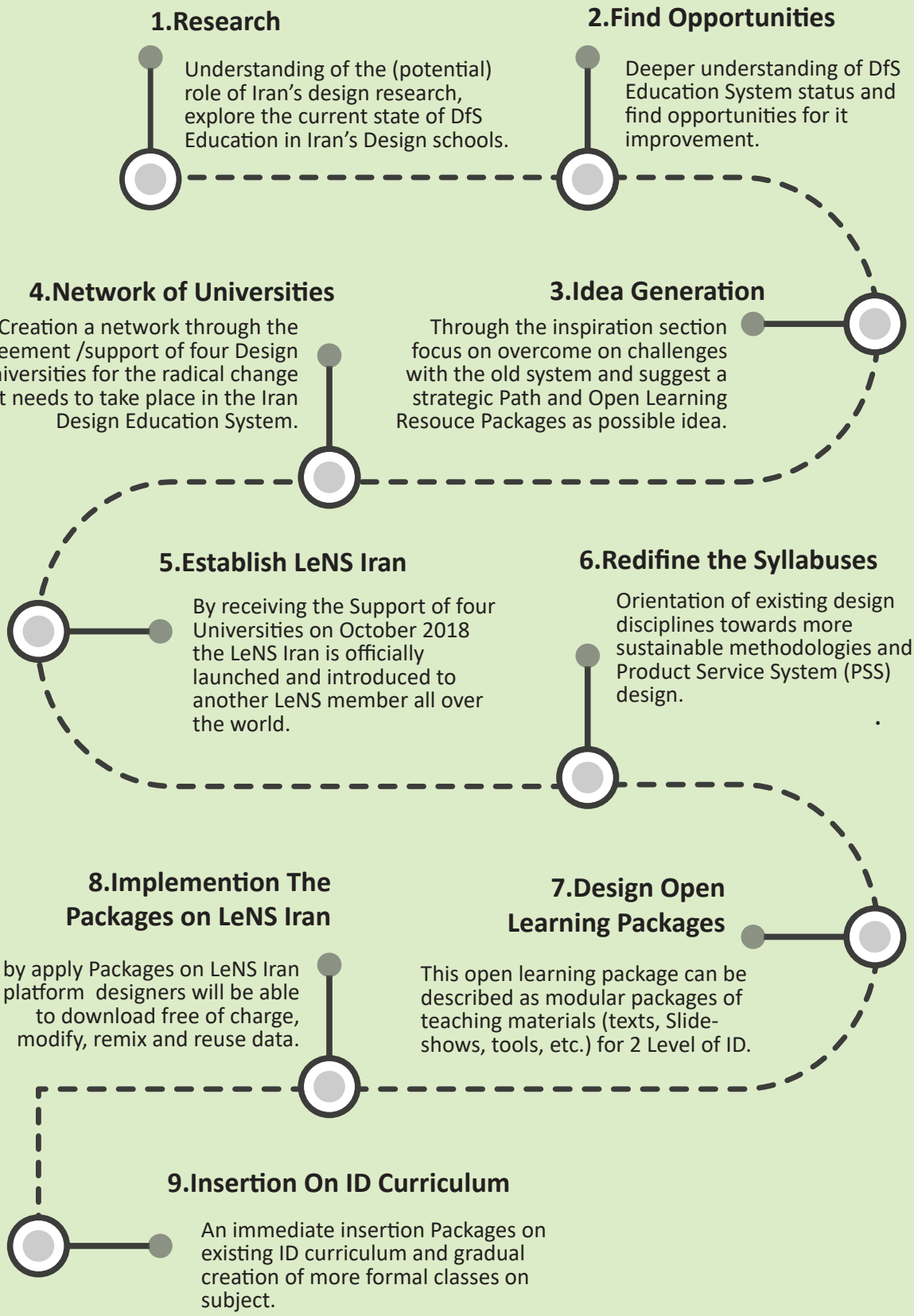

Table 9. The Strategic Path view

Figure 25. LeNS Network Partners

Introducing LeNS Network

The LeNS Network started from the former project LeNS (2007-2010) funded by the Asia Link Programme, EuropAid, European Commission, involving 7 design schools in Europe and Asia. In the meanwhile, the network expanded in Europe, in Central and South America, in Oceania and finally in Africa and then the LeNSes project.

The LeNSes project focused on System Design for Sustainable Energy for All (2013-2016) funded by the European Commission (ACP-EU Edulink II), involving 3 design schools in Europe and 4 in Africa.

LeNSin as an EU-supported (ERASMUS+) project is the International Learning Network of networks on Sustainability (2015-2018), that involving36 universities from Europe, Asia, Africa, South America and Central America.

The aim of the LeNsin is promotion of a new generation of designers (and design educators) capable to effectively contribute to the transition towards a sustainable society for all. improve the internationalization, intercultural cross-fertilisation, accessibility of higher education on Design for Sustainability (DfS) are three main goals of LeNsin.

The project focuses on Sustainable Product-Service Systems (S.PSS) and Distributed Economies (DE) – considering both as promising models to couple environmental protection with social equity, cohesion and economic prosperity – applied in different contexts around the world.

LeNSin connects a multi-polar network of Higher Education Institutions adopting and promoting a learning-by-sharing knowledge generation and dissemination, with an open and copyleft ethos.

LeNSin will also promote a series of diffusion activities targeting the design community worldwide. The final event will be a decentralised conference in 2018, based simultaneously in six partner universities, organised together by the 36 project partners form four continents.At the moment there are 13 active LeNS network in the world: LeNS India, LeNS Oceania, LeNS Africa, LeNS Europe, LeNS Cina, LeNS Mexico, LeNS Brazil, LeNS Italia, LeNS German Speaking, LeNS Colombia with more than 60 Universities involved.[1]

1. http://www.lens.polimi.it

The approach behind the LeNS project is that teaching subsides produced for courses, when free of charge, copy-left and easy available, could be an effective base for knowledge sharing and growing model. LeNS aims at becoming a prototypical mechanism for the development and difussion of System Design for Sustainability in Design Universities and Schools.
The LeNS project acts as a catalyst for actions and exchange on education (and research) in Design for Sustainability worldwide, through the production of the previously mentioned open-source data and web-platform to be easily reproduced in wordwide scale.

Reasons And Goals To Establish LeNS Iran

Joining Iran to LeNS project could be seen as a starting contribution for this shift by providing perfect platform to be used as an example and to adopt the knowledge and know-know needed for designers to be able to Design for Sustainability (DfS).

As this thesis aims to improve Iranian Design education system and using the values and ethos of the LeNS program as well as the concept of system design which is new for Iran Design community, indeed, implementation of LeNS Iran could be considered as a starting point of this long and complex process.

For the Iran Design Higher Education Institutions, a LeNS-like network is a win-win opportunity. LeNS web platform is free of charge for who are interested about Design for sustainability, they no need to pay for using the data and tools, it means is cost efficient. However, is also time efficient because Design educators only need simply to upload slideshows (eventually recorded ones), texts, etc. on platform. The functionality of Copyleft resources is to speed-up learning-by-sharing for teaching, i.e. remix/ reuse others' learning resources and make it knowledge-building efficient.

It is also imperative and inclusive because it should focus on Iran's perspective and defined by Iran's partners and try to distinguish Iranian cultural and social demand and issues.

Moreover, it increases potential for public fundraising because with an established network it is easier to successfully apply for any public fund and reputation and visibility attract consultancy on design for sustainably so it increases potential for governmental and private fundraising support to done with challenges.

For those students interested not only in applying what they have learned,even to upgrade their own practice.

Universities Agreement And Establish LeNS Iran

We must consider that the whole LeNs intiative is based on emerging technologies and trend regarding social phenomena such as creative communities, glocalization, open_source ethos, copy-left contents, ets. the way that Systam Design for Sustainability has been tought previuosly has been highly innovative in order to promote and communicate this values, and the aim of rapid dissemination of contents.

As this project aims to help Iranian Design education system to improve their strategies on learning Design for sustainability (DfS), indeed, the implementation of LeNS Iran could be considered as a starting point of this long and complex process to achieve more effective approaches. In this case, in following we clearly define the strategies of the process and the way we have taken to run this project successfully by deadlines.

As we mentioned before, for first step of this implementation we needed to gather vast amount of Design educators among of Iran's Art/Design universities, then explain the aims and benefits of project, and try to seek support amongst the academicals community in order to prepare the road for official lunch of lens Iran.

In order to create this Network of design for sustainability in Iran we listed all Art/Design Universities all over the Iran, and tried to made contact to get their support. Support from University of Art and Tehran University is of the highest importance since these universities have largest number of design students in Tehran as well as being located in capital city.

For the next step, a brief explanation of theoretical framework and the goals of LeNS Iran have already been prepared in Farsi language, to be sent to the main decision makers in each design university .

After several sending and receiving e-mails and Skyping between Universities and LeNS headquarter in Italy, Professor Carlo Vezzoli, four Design Universities from three different (Industrial) cities have agreed to expressed their support on the project. they agreed to involved to project by sharing their Design for Sustainablity related projects and research while using the exicting worlwide materials from LeNS International Platform.

Accordingly, after receiving the agreement of four Universities on October 2018 the LeNS Iran is officially launched. Then also introduced to another LeNS member all over the world by Prof. Vezzoli throughout the Network.

As the further step, a free space should provide on University of art 's main website as a place to install and develop the LeNS Iran platform. meanwhile, the Author tried to translate the main tabs and Pages of LeNS International Platform to Farsi Language and presented to web developers to have a real platform and ready to insert local materials on it. by this platform, Iranian designers will be able to download free of charge, modify, remix and reuse all the materials and needed information.

Below we have shown and mentioned the most pertinent ones in this stage of the project support. We believe that this list will become larger and more relevant as the project advancers.

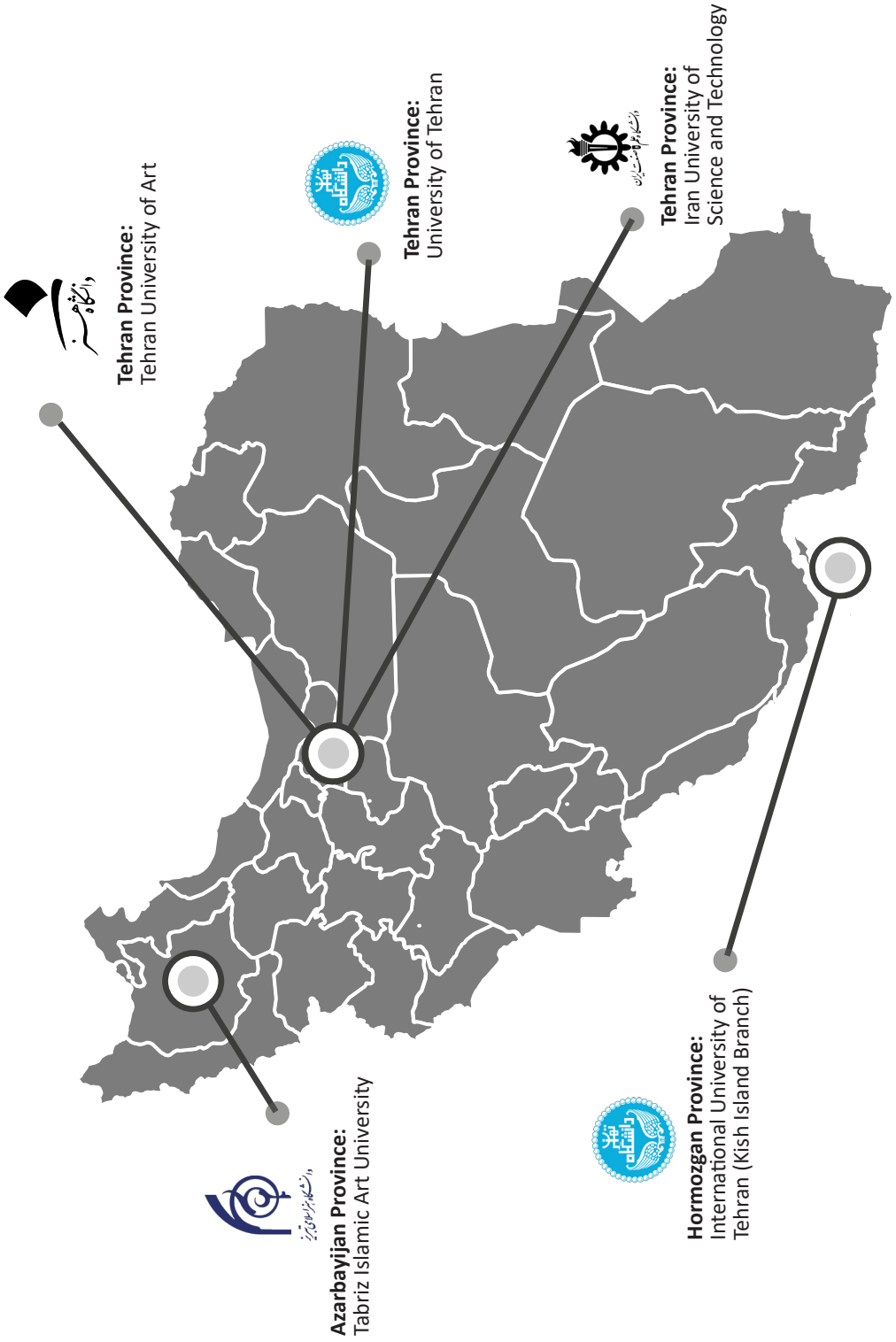

Figure 26.Supporter Universities Distribution

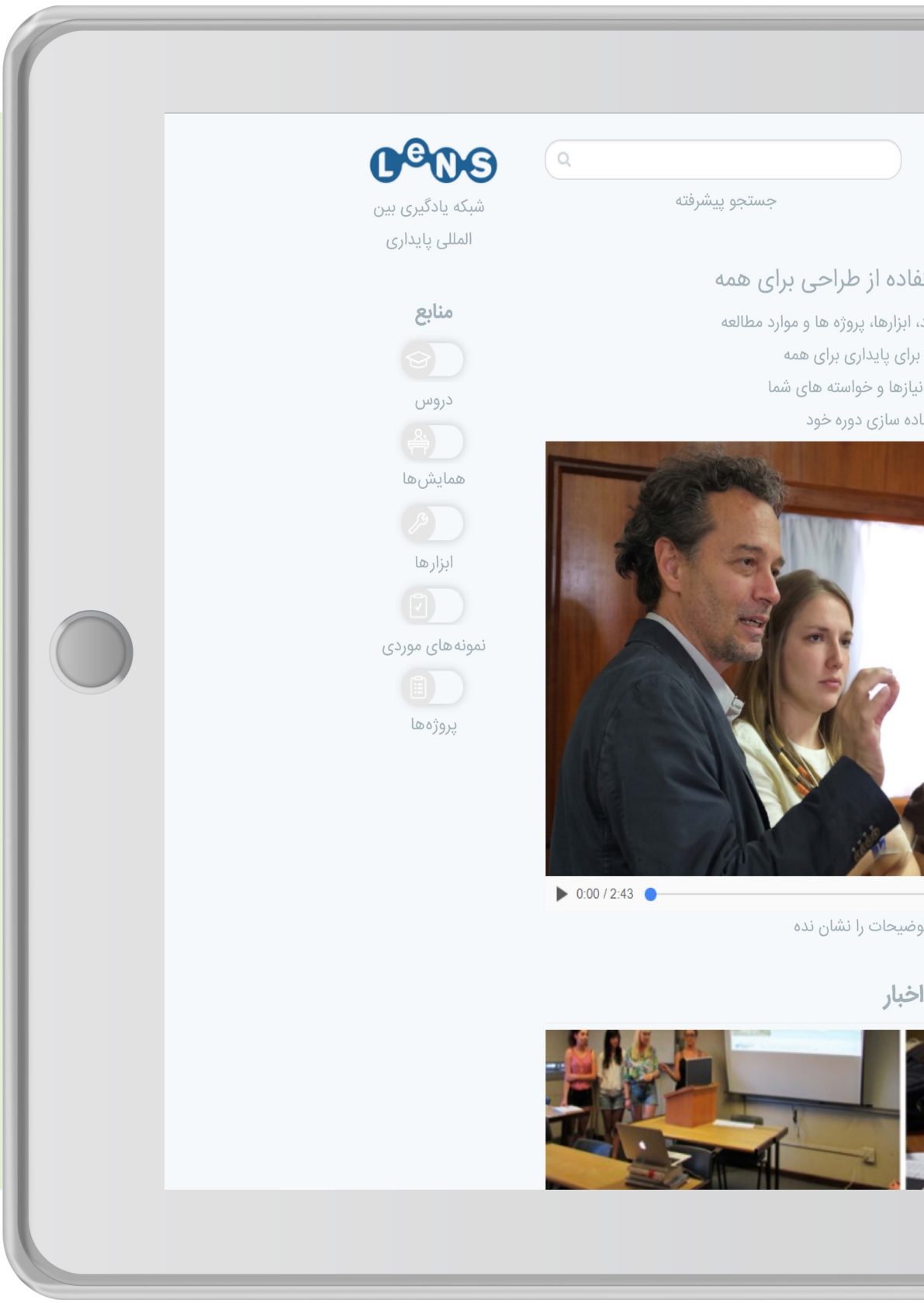

Figure 27. LeNS Iran Platform Overview


درباره
آزمایشگاه
شبکه
آموزش
ورود
زبان ها
پلت فرم
On/Off
LeNS اروپا
LeNS برزیل
LeNS ایتالیا
LeNSes سیستم انرژی
LeNS چین
LeNS مکزیک
Lens افریقا جنوبی
LeNS ایران

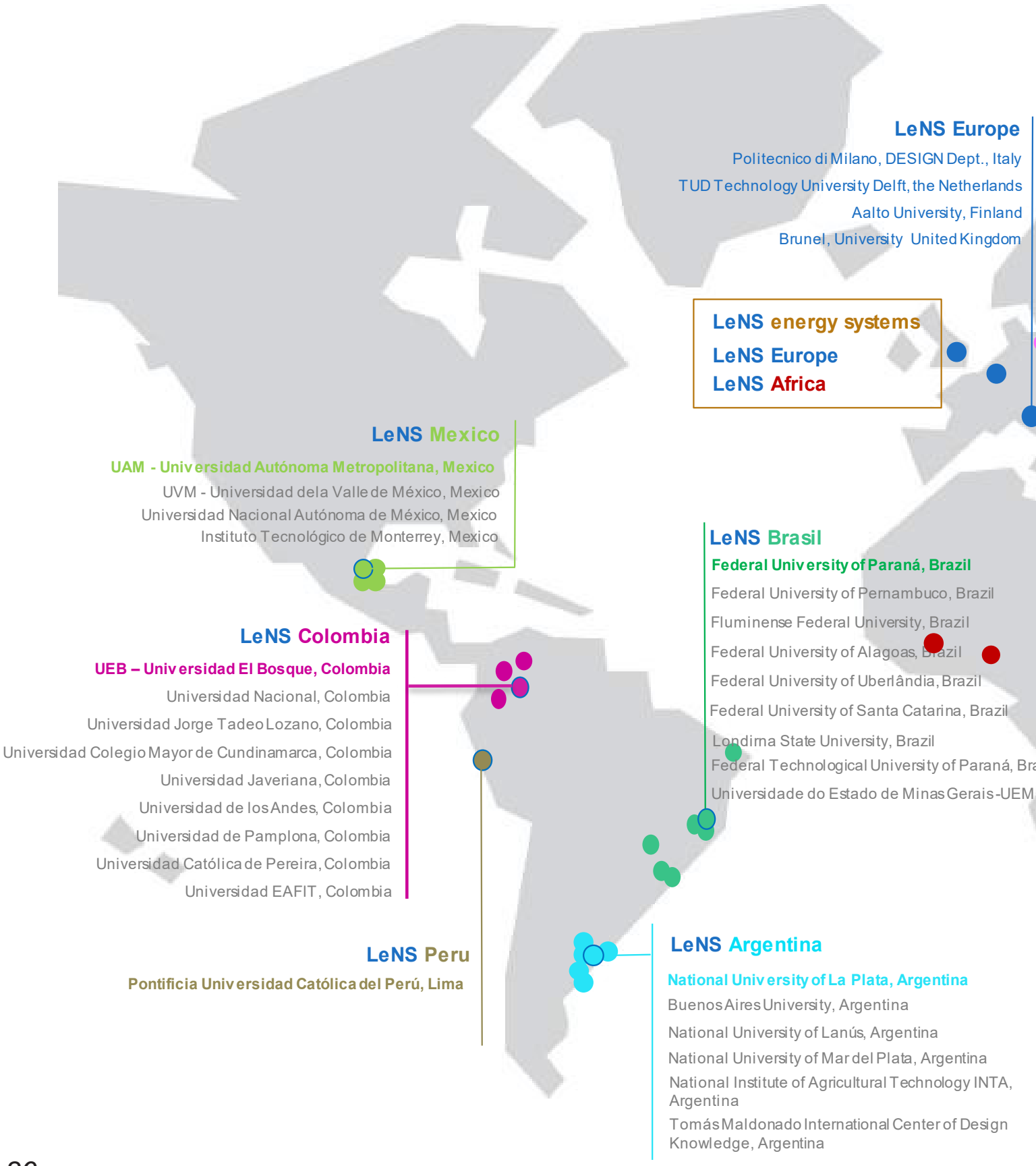

Figure 28. LeNS Network Partners distribution


LeNS EU German speaking languages
Institute of Design Research Vienna, Austria
Technical University, Austria
FH Joanneum, Graz, Austria
Muthesius Kunsthochschule, Germany
Köln International School of Design, Germany
Technical University Munich, Germany
ETH Zurich Center for Sustainablity, Switzerland
Zürcher Hochschule der Künste, Switzerland
LeNS China
Tsinghua University
Hunan University
Jiangnan University
Wuhan University of Technology
The University of Science and Technology Beijing
Tongji University
The Hong Kong Polytechnic University
Guangzhou academy of fine arts
Beijing Information Science and Technology University
LeNS Iran
Art University of Tehran
University of Tehran
Iran University of Science and Technology
University of Tehran, Kish International Campus
LeNS Italia
Politecnico di Milano, DESIGN Dept., Italy
Politecnico Torino
Università degli studi di Firenze
Napoli Federico II
Università Camerino
Università di Chieti
Università di Genova
Università IUAV di Venezia
Università di Palermo
Libera Università di Bolzano
Sapienza università di Roma
LeNS Vietnam
FPT University
University of Industrial Fine Arts
National University of Civil Engineering
Ton Duc Thang University
University of Science and Technology – The University of Danang
LeNS India
Srishti School of Art, Design and Technology
IIT - Indian Institute of Technology Guwahati
C.A.R.E. School of Architecture
Indian Institute of Information technology Design and Manufacturing Jabalpur
Indian Institute Of Technology Gandhinagar
Goa College of Architecture
Hunnarshala Foundation for Building Technology & Innovations
Vastu Shilpa Foundation
LeNS Africa
Cape Peninsula University of Technology, South Africa
Stellenbosch University, South Africa
Tshwane University of Technology, South Africa
University of Johnnesburg, South Africa
Makerere University, Uganda
University of Botswana, Botswana
Botswana International University of Science & Technology, Botswana
University of Nairobi, Kenya
Maseno University, Kenya
Machakos University, Kenya
Universitè Polytechnique De Bobo-Dioulasso, Burkina Faso
Kwame Nkurumah University of Science and Technology, Ghana
The Federal University of Technology Akure,, Nigeria
Zimbawe Institute of Vigital Arts, Zimbawe
Namibia University ì Science and Technology, Namibia
LeNS Oceania
University of New South Wales, Australia
RMIT, Australia
University of Western Sydney, Australia
Swinburne University of Technology, Australia
University of Melbourne, Australia
University of Canberra, Australia
Monash University, Australia
Auckland University of Technology, New Zealand

Design The Open Learning Resource Packages

The central part of the implementation strategy for to help promote Design for Sustainability in Iran higher education system is could be design the open learning resource package for both undergraduate and postgraduate level of Industrial design career.

The open learning Package is defined as practices which support production, use and reuse of high quality open education resources through institutional policies, which promote innovative models, and respect and empower learners as co-producers on their learning path. Open learning resource package could address the whole Design community: Students, Faculty members, Educators, professors and how are interested in the topic.

Open learning resources package embraces open learning strategies while improve the learning and teaching quality and leads to change of educational cultures. Use of open learning resource package must be seen as a value proposition for universities and institutions. Learners can benefit from quality and flexibility of resources, applying knowledge in a wider context, freedom of access and enhanced opportunities for learning.

The dynamics of this is different from the existing experiences though, the change that have been applied with regards to the previous course's dynamics respond to a new logic developed for Iran, based on regional needs and social cultural behaviors that we have tried to interpret. The novelty of this learning package also intends to be suggestion that if proved to be successful could be integrate the fix study plan program of Industrial design career for students who will attend to these courses in the next academic year.

The purpose of design the open learning resources packages is to graduate skillful designers with a fundamental understanding of sustainability principles, in theory and in application, capable of working in multidisciplinary teams, and aware of the context and systems, which design addresses. This may be accomplished by evolving the syllabuses, which focus on design and sustainability in the context of systems literacy, skills, and experiential learning.

Redefine Two Typical Sustainability Design Course Syllabuses

Shifting from current teaching modality to a more integral will be a long process. We propose as starting point aiming not only towards the creation of new career, but also to orientation of existing design disciplines towards more sustainable methodologies and Product Service System (PSS) design offers the tools for that.

In Order to validate the findings and define a newer and updated version of the Course scripts, the following steps organized and passed to finalized the process of developing the courses syllabus. First, presenting Suggested Course script by author to Prof. Fallah (Head of Industrial Design in Art university of Tehran). Then, receiving feedbacks and Comments from Prof Fallah and the rest of the faculty members. After that, appling the several changes and improvement strategies in order to give the best and proper framework structure to courseware.In following, receiving final acceptation from Prof. Fallah and faculty members. And Finally, making the Agreement with Prof. Mehdi Fallah (as a Head of Industrial Design in Art university of Tehran and final determiner) to fix the curriculum on Course study plan of Industrial Design program both in undergraduate and postgraduate level.

This set of syllabuses (undergraduate and post graduate) Is based mostly on the existing materials uploaded on the current (International) LeNS website and the course of System Design for Sustainability held by Carlo Vezzoli in politecnico di Milano. For this upgrading we have tried to include all the (basic theoretical framework for the practice of System Design for Sustainability. Covering subjects of environmental sustainability as well as socio-ethical sustainability.

Sustainability needs to be integrated as a critical lens in design, not to be considered as an extra-curricular concern, or as an elective. In fact, sustainable design should be synonymous with good design. As the tenets of sustainability become more blended with standard design education, there is great value in modeling a core sustainability curriculum to provide the essential foundation and context for this work.

As an important fact is worth to mention here that, the suggested course wares should be complement of each other. It means that the syllabus that are teaching on the master (post graduate) level is continuing and extender the ones that are teaching on the undergraduate level. It is evident that we cannot impose a new methodology right away, this should be gradual transition, and we must leave space for other changes and proposals from external investigations as time goes by and new methods and tools are created.

How The Syllabuses Structured

These Syllabuses could be primarily created for Industrial design and programs at the graduate and undergraduate level, but it can be adopted for teaching to most any design courses at most any level.

The course is structured in such a way that by dedicating 2 hours a week to study and engagement with the material which students be able to follow the flow and benefit a lot – enough to reach the level of understanding and the quality of completed assignments to successfully complete the course and earn the knowledge of Design for Sustainability. We expect that the quality and quantity of the learning materials will be incremented after the program has been launched.

These courses are studio courses, meant to teach students by making and doing, instead of merely reading and regurgitating. It allows them to apply what they have learned, It's designed to teach students of all types (This course could be taken as an elective by students from other disciplines) the principles, common frameworks, tools, and strategies of sustainability, putting theory into practice. The curriculum includes presentations, syllabus, required and suggested readings, exercises, projects, and evaluation criteria that instructors can use to customize the course for themselves.

A core component of this classes is focus on humanitarian and social aspects of art and design, with sustainable development as a key thematic thread of inquiry, particularly as this theme relates to interconnected global issues such as poverty, inequity, and environmental degradation. While an LCA is not always applicable, a rigorous understanding of existing cultural, economic and social parameters within a given community informs and provides the basis for design strategies and outcomes.

Below are listed courses scripts for both undergraduate and post graduate level. The curriculum and scheduling, is ever-evolving, as the various disciplines incorporate sustainability into their course work and requirements. It is suggested that introductory sustainability courses be taken early, to allow students to take a greater number of related courses and to prepare students for advanced design courses.

Undergraduate Course Plan

Current name: 5th Industrial Design Project
Suggested name: Basics of Design for Sustainability

Credits: 3 totally (1 theoretical- 2 practical)
Durations: (17 weeks / 2 hours per sessions)

Goal of the Course:

The purpose of this course is to familiarize with the concepts of Sustainability design in order to introduce and review the environmental and social crises of Iranian community. Moreover, to evaluate successful Cases of sustainable Iranian products and services, Making the awareness of consumerism and social well-being. Introducing the role of designers and as a final teaching principles of system innovation, life-cycle assessment design methods.

Course Description

In this lesson, we will look at the issues and challenges of sustainable development and the role of sustainability design in addressing the needs and crises in Iran and solve them(current environmental, social, ethical-economic). In this regard, we will explore Some Solutions and successful case studies.

Resources Suggestions

- System Design for Sustainability: theory, methods and tools for satisfaction system / Carlo Vezzoli (2010)
- A Strategic Design approach to develop sustainable product service systems / Ezio Manzini, Carlo Vezzoli (2003)
- Product Service systems and Sustainability: opportunities for Sustainable solutions / Ezio Manzini, Carlo Vezzoli (2002)
- Design for Services / Meroni.A, Sangiorgi.D (2011)

UNDERGRADUATE PLAN

 # Design for sustainability: the reference framework

The environmental problematic (Iran)
What is eco-design?
What is green design?
Four levels of design intervention
Environmental redesign of existing products (case Studies)
Design of new sustainable products and services (case studies)
Proposal of new scenarios that correspond to sustainable lifestyle

 # Social welfare analysis and reflections about consumerism

Industrial ecology and de-materialization
Ownership based wellbeing and access based wellbeing (Case studies)
Lightness of the products as a not sufficient, but necessary condition
Dematerialization: turning to services for reaching sustainability
What is social learning process?
Social innovation: a set of promising active minorities

 # Sustainable development and design: context of reference

Introduction to sustainable development
Environmental sustainability
Socio-ethical sustainability

 # The role of designer

Widening the role of the designer
What is design for sustainability?
What is system innovation?

 # State of the art of Design in relation to sustainability

Low impact material and energy sources
Life cycle design and eco design
Design of eco efficient product service system
Design of equity and social cohesion
Current situation of ''design for sustainability'' in Iran's existing projects

 # Introduction to life cycle Design

Environmental requirement for product design
Damaging environmental effects
Life cycle assessment
Life cycle oriented design (functionality)
Life cycle design criteria
Resources minimization
Selection of low impact resources
Product life optimization
Material life extension
Design for disassembly

Postgraduate Course Plan

Current name: Sustainability Design
Suggested name: System Design for Sustainability

Credits: 2 totally (1 theoretical- 1 practical)
Durations: (17 weeks / 2 hours per sessions)

Goal of the Course:

The main goal of the project is to enable the designers to implement the concepts which was taught, such as designing and innovating environmental service systems, creating satisfaction among beneficiary systems and creating social solidarity, and ultimately recognizing and using relevant methods and tools for all kind of projects (university and business projects). Therefore, this lesson requires a group work project structure to create an experience alongside learning theoretical topics.

Course Description

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- Product Service systems and Sustainability: opportunities for Sustainable solutions / Ezio Manzini, Carlo Vezzoli (2002)
- Design for Services / Meroni.A, Sangiorgi.D (2011)

POSTGRADUATE PLAN

 # Design of eco-efficient systems
Eco efficient system innovation
Types of innovation in eco-efficient systems
The transition towards eco efficient systems
Non desired effects
Product service system definition
The limits of PSS diffusion

 # Criteria and Methods for eco-efficient innovation
Satisfaction based approach
Stakeholder interaction approach
Eco efficient approach
Eco efficient criteria
System life optimization
Transport and distribution reduction
Resource reduction
Conservation and biocompatibility
Toxicity reduction

 # Design for equality and social-cohesion
The socio-ethical dimension of sustainability
A concern affecting all economies
Relation between environmental socio- ethical sustainability
Emerging models and tools
Distribution economies and social solidarity networks
Locally based and network structured initiatives
System innovation opportunities in Iran

 # System design for social equity and cohesion
Design for social equity general framework
New potential role of designers
Design guidelines for social ethical sustainability
Encouraging a sustainable and responsible consumption
Improving social cohesion
Empowering local resources

 # Design for social innovation
Small local open connected scenarios
Sustainable use of local resources
Cases of design for social innovation

 # Methods and tools for system design for sustainability
The lens Iran and how to use it
MSDS: a modular method for system design for sustainability

Practical part in Postgraduate level: (Design Studio)

The objective of the Design Studio is to practice the application of Design for sustainability principles, students will collaborate with a design team to develop skills in applying what they have learned to real-world case studies. The case study serves as an integrative exercise where participants explore the relationships between personal, social, ecological and economic sustainability. Design teams will be decided before the beginning of each Design Studio. These may, but not necessarily need to be, drawn from environmental or social issues that Iran is currently faced.

Preparation The Content Of Packages (Slides, Tools, Casestudies)

As the other main point of designing an open learning source for Iranian designers set of preliminary tools, teaching material and presentations (slideshows) that also would promote the values and ethos of the LeNS program will be required and suggested for the launching of the courses.

The main issue here is the language adaption, as the existing lessons or any kind of the teaching material that are available on LeNS platform are currently not in Farsi language and just supported English, Chinese, Spanish versions.

This is the main barrier for dissemination and it should be solved first. In the process of translating the courses and materials we have consider about adoption the content regarding the need to eventually determine regional parameter to survey the local environmental status, instead of borrowing foreign indicators, practices which can sometimes lead to misinterpretation of priorities.

These Courses contents and tools are meant and has been developed to be a ''bridge'' between language, data and tools of the sustainability assessment ''world'' and the ''world'' of designers, when dealing with complex systems.

Regarding the pertinent changes to be made in relation to the Sustainability Dimensions section that contains the Environmental, Socio-ethical and Economic sub-sections there should be a priority checklist that fits the main Iran environmental and social concerns, which may differ from current ones. Although the existing Criterions are general enough to be interpreted from local perspective, a careful analysis of each should be taken into consideration and then releasing.

Course Contents (Slide Shows)

As first action toward this changes, the adoption and translating some main slides from existing and available courses and materials which are available on LeNS platform to Farsi language, this process is under supervision and coordination Prof. Fallah and the approval of the other members of Industrial design faculty of Art university of Tehran.

The selection of courses slides is based on requirements and in relation with the offered course scripts, on the other hand the experiences of the professors and faculty members about level of student's understanding.

As we mentioned in prevous parts regarding the need to determine regional parameters to survey the environmental status, we relize that borrowing databases and content used and developed by foreign countries presents a problematic if we want to obtain valid resultd regionally. Even though most of the productive processes are similar worldwide we must take into consideration local peculiarities that will influence the overall environmental impact.

The Tools And Methods

In addition to preparing the course slides, we also prepared Farsi/ Persian version of some tools and methodologies for the package. An open collection of tools is used in design processes to deal with complex systems. The aim of providing and translating the tools is providing a better understanding of how the concept of sustainable design can be more effectively integrated in design practice.

The use of the tools requires some skill. If students are not trained to use it is difficult to use them in their projects. Access to LeNS International platform give this chance to users to learn how the tools works on other worldwide issues. In order to understand how to use methods and tools to orientate design towards sustainable solutions it is useful also for Iranian designers to use as a benchmark a simplified scheme of the development phases of products,

services or systems, where those phases can be underlined that lead to design of the system concept, then to detailed design of the system, and finally lead to the related system engineering.

Some of the tools are to orientate the design process towards sustainable system innovation such as Sustainability Design-Orientating tool-kit (SDO) Subsequently other tools are to design system innovations in general, for example: Stakeholder system map, Satisfaction system map, Interaction table (storyboard), etc.

Case Studies

The most important advantages of using a case study in educational system is that simplifies complex concepts that students struggle within. Case Studies expose the participants to real life situations which otherwise is difficult. On the other hand, it improves analytical thinking, communication, developing different views on the same subject and enhance team work. The many solutions which came out of the case act as ready reference when students face similar problems at their projects.

In this project Studying case studies help designers to Learn the outcomes of the many sustainability projects other that students have designed in the world, how they taking active roles in transitioning their existing communities, institutions and neighborhoods, to more sustainable patterns of production and consumption, as well as leading more joyful, meaningful and healthier lives.

The Packages Structure

Undergraduate Course Package

Course Name: *Basics of Design for Sustainability*
Credits: *3 totally (1 theoretical- 2 practical)*
Durations: *(4 months / 2 hours per sessions)*

Month One

Learning Goals and Creteria of Month:

-Course scope and structure exam's modalities
-bibilography and learning resources
-other info
-The LeNS international netwok

Learning Content Of The Month:

Design for sustainability: the reference framework

-The environmental problematic (Iran)
-What is eco-design?
-What is green design?
-Four levels of design intervention
-Environmental redesign of existing products (case Studies)
-Design of new sustainable products and services (case studies)
-Proposal of new scenarios that correspond to sustainable life style

Learning Tools:

Interaction Storyboard

Tool to design and visualise the main functioning of the system in time: the narrative (stories) of the front-desk (with the client) and back -stage interactions (between oth er stakholders) involved in the system.

Images Library

A catalogue of images to be used to build interaction table, storyboard and offering diagrams

Offering Case Studies:

Case Study Name: Shared Solar

Shared Solar offers to houses and small businesses of off-grid rural villages a decentralized solar station connecting houses and small business through local mini-grid. Users pre-pay per time through scratch cards or even through mobile phones (without fee). The solar station (micro generator + its accessories) are all owned by Shared Solar, as donation from the Millennium Village project (sponsoring the project). All energy using products are

owned by the users. Added services are installation and in use services (i.e. maintenance, repairing, …) that are all in charge to Shared Solar.

Sustainable criteria and guidelines-sustainability for all criteria (s.pss & de)

Optimise DE structure
Offer DECENTRALIZED Economy Systems to locally supply DE production throughout a MINI-NETWORK for homes and/or business sites.

Month Two

Learning Goals and Creteria of Month:

Sustainable development and design: the reference frame work
-Sutainable development and system innovation
-The sustainable development size and quality of change for
-a sustainable development

Learning Content Of The Month:

Social welfare analysis and reflections about consumerism
-Industrial ecology and de-materialization
-Ownership based wellbeing and access based wellbeing (Case studies)
-Lightness of the products as a not sufficient, but necessary con dition
-Dematerialization: turning to services for reaching sustainability
-What is social learning process?
-Social innovation: a set of promising active minorities

Learning Tools:

(S.PSS) Animatic
Tool to visualise / present a designed concept, to involve potential stakholders e.g. system actor, financial insitutions.

Offering Case Studies:

Case Study Name: TREATSTOCK
Treatstock is a 3D printing network, where 3D designers and print services can come together to produce 3D printed products for people all over the world. The site unites both a 3D printing marketplace and an online platform for 3D printing services, allowing distributed manufacturing.

Sustainable criteria and guidelines-sustainability for all cri

teria (s.pss & de)
Optimize stakeholders configuration
Optimize stakeholder partnership with horizontal integration (by combining more than one DE type as a full package offer)

Month Three

Learning Goals and Creteria of Month:

The evolution of sustainability within design
-incresing role of design (foe sustainability)
-evolution of sustainability withih design
-design for sustainability: state of the art
-a pluralism of aesthetics foe sustainability

Learning Content Of The Month:

Sustainable development and design: context of refer ence
-Introduction to sustainable development
-Environmental sustainability
-Socio-ethical sustainability
The role of designer
-Widening the role of the designer
-What is design for sustainability?
-What is system innovation?

Learning Tools:

Interaction Table
Tool to design and visualise the functioning of the system in time: the narratives (stories) of the front-desk (with the clients) and back-stage interactions (between other stak holders) involved in the system.

Offering Case Studies:

Case Study Name: LINUX
Linux is an free and open-source operating system that is used in smartphones, personal computers, netbooks, super computers, servers, embedded devices, home appliances, cars etc. The underlying source code may be used, modified and distributed by anyone under the GNU General Pub lic License, which requires that anyone who distributes software based on source code under this license, must make the originating source code (and any modifications) available to the recipient under the same terms.

Sustainable criteria and guidelines-sustainability for all cri
teria (s.pss & de)
Optimise DE structure
Offer DE system with CONNECTION to WORLWIDE-NETWORK / MAIN-GRID, enabling homes, small business and communities the selling/purchasing of production or for enabling shared use of the DE hardware

Month four

Learning Goals and Creteria of Month:

Product Life Cycle Design
-Product Life Cycle Design: An introduction
-Product environmental effects and requirments
-Life Cycle Assessment (LCA)
-Life Cycle Design approach: life cycle functional
-Product Life Cycle Design criteria

Learning Content Of The Month:

State of the art of Design in relation to sustainability
-Low impact material and energy sources
-Life cycle design and eco design
-Design of eco efficient product service system
-Design of equity and social cohesion
-Current situation of ''design for sustainability'' in Iran's existing projects

Introduction to life cycle Design
-Environmental requirement for product design
-Damaging environmental effects
-Life cycle assessment
-Life cycle oriented design (functionality)
-Life cycle design criteria
-Resources minimization
-Selection of low impact resources
-Product life optimization
-Material life extension
-Design for disassembly

Learning Tools:

System Map
System map Tool to design and visualise the configuration of the system, describing actors involved and their interac tions.

Offering Case Studies:

Case Study Name: Domestic Biogas

Biogas Sector Partnership installed biogas plants in households, providing biogas for cooking and lighting. A plant costs between 350 and 450 €; about one third of this is paid in-kind, through the family providing labor and materials. The remaining is paid usually in 18 months, with opportunity of micro-financing plans. Customers are trained for minor repairs and operations on plants; a three-year guarantee period is included. Same biogas plants are built for schools and hospitals.

Sustainable criteria and guidelines-sustainability for all cri teria (s.pss & de)

Optimise DE structure

Offer STAND-ALONE DE systems for homes or business sites (especially isolated sites).

Some Transformed And Translated Content For Undergraduate Level

Slides:

Tools:

Case Studies:

Postgraduate Course Package

Course Name: *System Design for Sustainability*
Credits: *2 totally (1 theoretical- 2 practical)*
Durations: *(4.5 months / 2 hours per sessions)*

Month One

Learning Goals and Creteria of Month:

Sustainable Product-Service Systema
-Sustainable Product-Service Systems innovation
Resume: sustainability and system iinovation
sustainable Priduct-Service system
(S.PSS): an introduction
S.PSS types
S.PSS definition and main characteristics

-Sustainable Product-Service Systems: sustainability bene fits and limits
S.PSS: a win-win opportunity for sustainability
S.PSS environmental benefits
S.PSS socioethical benefits
S.PSS economic and competitive benefits
PSS unsustainability
S.PSS barriers

Learning Content Of The Month:

Design of eco-efficient systems
-Eco efficient system innovation
-Types of innovation in eco-efficient systems
-The transition towards eco efficient systems
-Non desired effects
-Product service system definition
-The limits of PSS diffusion

Criteria and Methods for eco-efficient innovation
-Satisfaction based approach
-Stakeholder interaction approach
-Eco efficient approach
-Eco efficient criteria
-System life optimization
-Transport and distribution reduction
-Resource reduction
-Conservation and biocompatibility
-Toxicity reduction

Learning Tools:

Concept Description form_S.PSS_DE

To describe and characterize Sustainable Product-Service Systems (S.PSS) applied to Distributed Economy (DE) concepts

Innovation Diagram_S.PSS_DE

To Select, mao and cluster most promising ideas and create and characterize the profile of the Sustainable Product

Offering Case Studies:

Case Study Name: Indigo

Indigo allows customers purchase a Solar Home System (SHS) for only 10 euro; composed by a 3-watt solar panel, battery, two LED lamps and one phone charge unit with cables. Customers then pay on a pay-as-you go system: buying 1 euro scratch card from local vendors to access electricity for a week inserting the code in their system battery. The power generated from these solar panels provides nearly eight hours of light each evening and sup ports mobile phone charging. Over the course of typically 18 months, the purchase of scratch cards allows the system to be paid off and the customer can choose to either unlock their Azuri system forever or upgrade to a larger model.

Sustainable criteria and guidelines-sustainability for all criteria (s.pss & de)

Delink payment from hardware purchases and resource con-sumption.Offer PAY x TIME, i.e. the cost is fixed per minutes/sec onds of access.

Month Two

Learning Goals and Creteria of Month:

System Design for Sustainability

-System Design for Sustainability

S.PSS main characteristic: a resume
system design sustainability
criteria of system design foe eco-efficiency
criteria of system design for socila equity and cohesion
sustainability criteria priorities evaluation

-System design foe eco-efficiency guidlines and examples

System life optimization
Transportation distribution reduction
Resource reduction
Waste minimization
Conservation/Bio compability
Toxicity reduction

Learning Content Of The Month:

Design for equality and social-cohesion

-The socio-ethical dimension of sustainability
-A concern affecting all economies
-Relation between environmental socio- ethical sustainability
-Emerging models and tools
-Distribution economies and social solidarity networks
-Locally based and network structured initiatives
-System innovation opportunities in Iran

Learning Tools:

SDO Scenario for S.PSS and DE

Senario to inspire designer to design Sustainable Product-Service Systems (S.PSS) applied to distributed Economy (DE) in low and middle income (all) contexts

Stakeholder Motivation and Sustainability table

Tool to define main motivation and benefits (economic, so cio-ethical, environmental) that each actor of the system can have/bring in a offer

Offering Case Studies:

Case Study Name: Husk Power

The company provides energy solutions by installing biomass power plants and then wiring villages to deliver electricity. Husk Power design and installs the mini grids that can also be connect ed to the national grid. A partnership with local farmers is established to provide rice husk to power the plant. Households pre-pay a fixed monthly fee, around 2-3 euro, to light up two flu orescent lamps and one mobile charging station (owned by the customer). The company retains ownership of the DRE micro-generator and it employs local agents for operation, main tenance and fee collection.

Sustainable criteria and guidelines-sustainability for all cri teria (s.pss & de)

Optimize stakeholders configuration
Optimize stakeholder partnership with horizontal integration (by combining more than one DE type as a full package offer)

Month Three

Learning Goals and Creteria of Month:

- System design for social equity and cohesion quidelines and examples

Improve employment working condition
Improve equity and justice in relation to stakholders

Enable a sustainable consumption
Integrate the
Improve social cohension
Empower/enhance local resources

Learning Content Of The Month:

System design for social equity and cohesion

-Design for social equity general framework
-New potential role of designers
-Design guidelines for social ethical sustainability
-Encouraging a sustainable and responsible consumption
-Improving social cohesion
-Empowering local resources

Design for social innovation

-Small local open connected scenarios
-Sustainable use of local resources
-Cases of design for social innovation

Learning Tools:

Sustainability Design-Orienting (SDO)

On-line version Toolkid to orientate system design process to wards sustainable solutions (enviromental, socio-ethical,econom ic). it is a modular software toolkid supporting the following pro cess: A: existing system qualitative sustainability analysis prior itisation of sustainability criteria/guidelines. B: best practices analysis/identify sustainable existing options. C: generate sus tainability-focused idea. D: check/visualise sustainability improv ment/ worsening of developed concepts

Socio-technical experiments design guidelines

Idea generation guidelines to design socio-technical experiments

Offering Case Studies:

Case Study Name: Solarkiosk

The company targets local entrepreneurs, especially women, for the provision of energy services through charging stations. So larkiosk design and installs the E-Hubb, a charging station pro vided with solar panels and energy using products and recruits local entrepreneur who manages the system and appliances. Due to the modular configuration of the station, he/she can provide a wide range of energy services such as inter net connectivity, water purification, copying, printing and scan ning etc. Customers pay for the service they need: pay to print, pay to get purified water, pay for internet access, etc.

Sustainable criteria and guidelines-sustainability for all cri
teria (s.pss & de)
Offer ownerless DE systems as enabling platform
The PROVIDER/S complements an ownerless offer of the DE.

Month Four

Learning Goals and Creteria of Month:

Methods and tools for System Design for Sustainability (SDS)
- MSDS Method for System Design for Sustainability

A resume of System Design for Sustainability
MSDS: objectives, approach and phases
MSDS: main tools

Learning Content Of The Month:

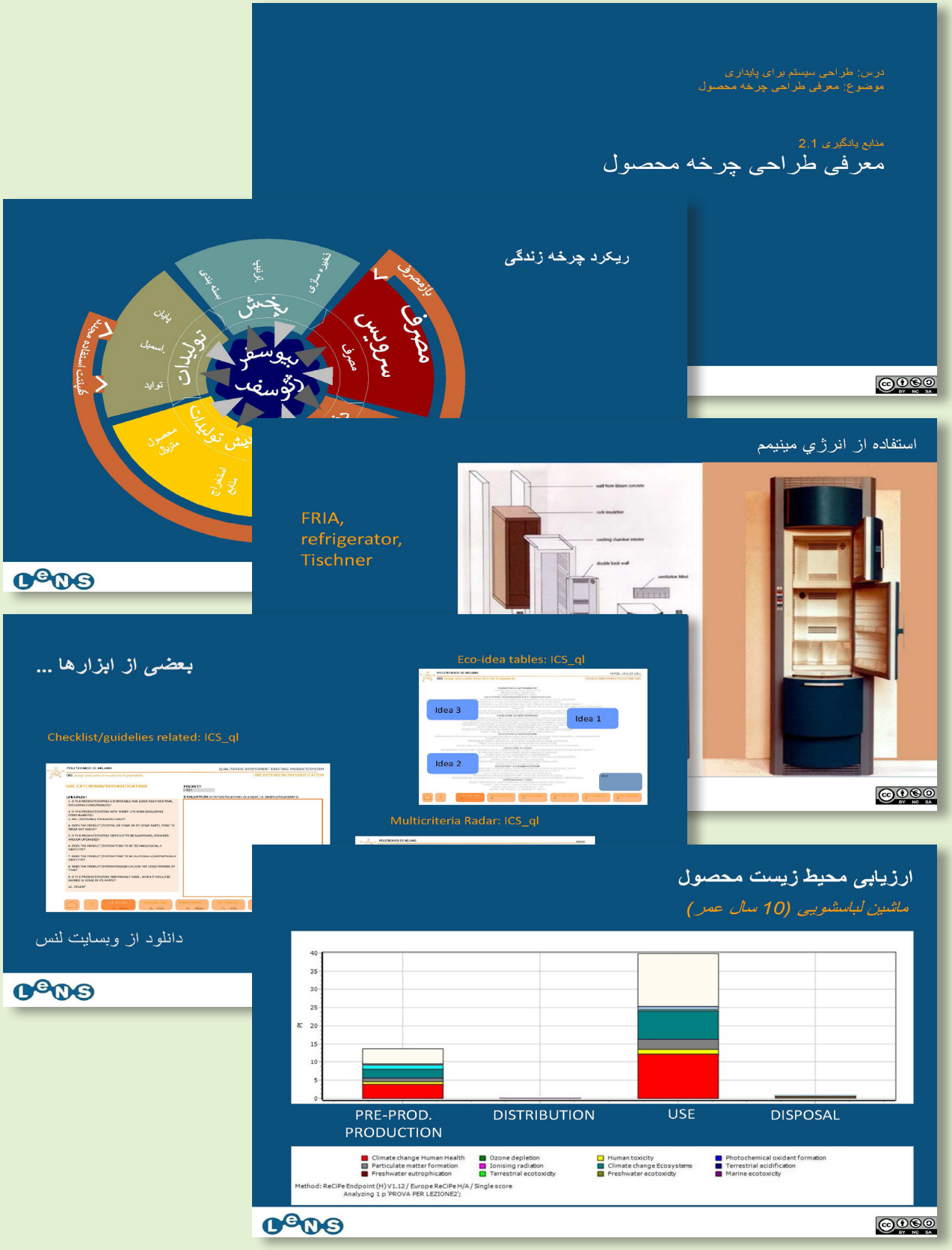
Methods and tools for system design for sustainability
-The lens Iran and how to use it
-MSDS: a modular method for system design for sustainability

Month Five (1/2)

Practical part in Postgraduate level: (Design Studio)

The objective of the Design Studio is to practice the application of Design for sustainability principles, students will collaborate with a design team to develop skills in applying what they have learned to real-world case studies. The case study serves as an in tegrative exercise where participants explore the relationships between personal, social, ecological and economic sustainability. Design teams will be decided before the beginning of each De sign Studio. These may, but not necessarily need to be, drawn from environmental or social issues that Iran is currently faced.

Slides:


درس: طراحی سیستم برای پایداری
موضوع: معرفی طراحی چرخه محصول
منابع یادگیری 2.1
معرفی طراحی چرخه محصول
ریکرد چرخه زندگی
پیوسفر
رتوسفر
پخش
تولیدات
مصرف
سرویس
FRIA,
refrigerator,
Tischner
استفاده از انرژی مینیمم
بعضی از ابزارها ...
Eco-idea tables: ICS_ql
Idea 3
Idea 1
Idea 2
Checklist/guidelies related: ICS_ql
Multicriteria Radar: ICS_ql
دانلود از وبسایت لنس
ارزیابی محیط زیست محصول
ماشین لباسشویی (10 سال عمر)
PRE-PROD.
PRODUCTION
DISTRIBUTION
USE
DISPOSAL
Climate change Human Health
Particulate matter formation
Freshwater eutrophication
Ozone depletion
Ionising radiation
Terrestrial ecotoxicity
Human toxicity
Climate change Ecosystems
Freshwater ecotoxicity
Photochemical oxidant formation
Terrestrial acidification
Marine ecotoxicity
Method: ReCiPe Endpoint (H) V1.12 / Europe ReCiPe H/A / Single score
Analyzing 1 p 'PROVA PER LEZIONE2'

طراحی سیستم برای پایداری درس
توسعه و طراحی پایدار: چارچوب مرجع .1 موضوع

منابع یادگیری 1.1 توسعه پایدار و نوآوری سیستم

ابعاد پایداری

محیط زیست (شیمیایی و فیزیکی)
- بیش از بیوسفر و انعطاف پذیری ژئوسفره

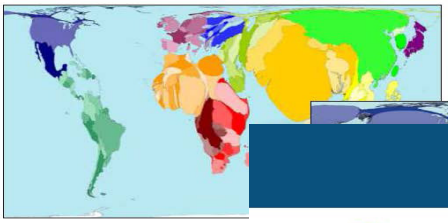
اجتماعی اخلاقی
- سطح منابع مشابه (رضایتمندی) برای نسل های آینده

GLOBAL WARMING: 135 YEARS OF IN 30 SECONDS

گرمایش جهانی

ثبات اجتماعی

20 درصد از جمعیت جهان از 80 درصد منابع طبیعی استفاده می کنند



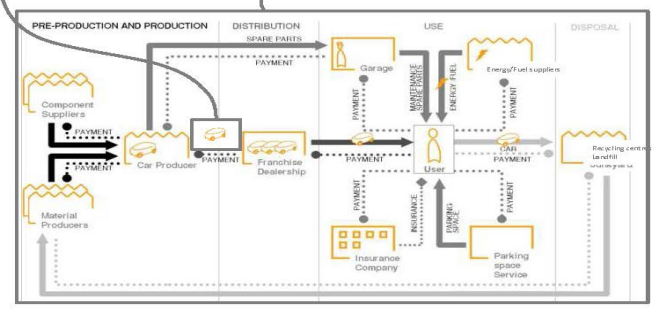
اندازه هر قلمرو نشان دهنده نسبت
نسبی جمعیت جهان در آن کشور
است[source:
worldmapper.org]

قلمرو نشان دهنده میزان
ی اکسید کربن در سال
ست که به طور مستقیم از
آنجا بود
worldmapp

ارتقاء سیستم های نوآورانه
تمرکز بهبود (طراحی) باید ...

... نه تنها در محصول (به عنوان مثال ماشین) ...

... بلکه در کل سیستم عرضه و تقاضا که تقاضای خاصی از (رضایت مشتری) (مثلا تحرک) را برآورده می کند



Tools

Case Studies

7.Support of Teaching Staff on diffusion the DfS throughout the Strategic path

From educators' perspective, the value of using an open learning resources may lie more in enabling them to enrich their students' learning experience than in saving time developing resources themselves.[1] Using this Open Learning resource package allows educators and cadres of professionals to maintain and improve their knowledge and professional competence throughout their careers.

students also benefit from a variety of learning resources to enrich and support different learning styles. Sharing resources enables teaching staff to provide a wider range of resources to their students. Educators are continually developing resources and their distribution is supported by publicly available collections of Open Educational Resources.

Although this project is planned to be carried out with very small amount of personnel, some people will be required for the different stages of implementation, we foresee that as the project grows in organization and promote, it will be easier to recruit master's and PH. D students that want to participate.it is important to mention that there are currently very few design students or professionals advocated to Design research, with the Sustainability Design background.

Therefore, it will be hard to recruit highly qualified design professionals to work in the project so there will be a need to educate or promote self-education in the design for sustainability subjects for the people that will collaborate during the first phase. We believe that many recently graduated professionals will already have the desire to work on sustainability subjects, even as unpaid collaborators during the first phase.
Since we promoting bottom-up initiative, we expect the students and professors themselves to participate and collaborate, both virtually by uploading content to the web platform and personally by adopting sustainability curricula and diffusing it through existing classes.

I intend, as an author of this thesis, to keep working on implementation of this strategy and diffuse in my country the knowledge that I have acquired during my master's degree in Product service system design, and as a member student in the System Design for Sustainability Course, as well as the knowledge learnt during the research for the thesis.

1. Open Educational Resources: The value of reuse in higher education/White, D., & Manton M. /2011/University of Oxford

8.Use and adopt the Strategic Path on ID curriculum and LeNS Iran Network to diffuse DfS

As we have mentioned in the previous parts, the discipline of system design for sustainability is fairy new in Iran, and entirely unknown in the design career. In the program presented for the graduate and post-graduate level, we have tried to include a reference on all the main aspects of Design for Sustainability (DfS).

All the materials that have been generated and translated in regard to this path and promotion strategy are documented properly and uploaded in the LeNS Iran Platform, enabling it's sharing in the country and internationally. Moreover, the prepared course wares and Tools are deliberately designed to be flexible so that they can be used by any universities/institutions and higher education systems in ways that best meet local needs.

Then after the Implementation the materials on the LeNS Iran Platform, This Package (New course ware included learning tools and materials) should first introduced to related educators and professors during the introduction session that will hold by Prof. Fallah, where each will have an opportunity to be exposed to main contents of each subject.

Ideally, training courses are best developed by educators skilled in instructional design who have solid background in and knowledge of topic areas. However, the skilld involved in designing and implementing a training program can be learned by observing good trainers and paying attention to how they use different methods.

After the course proves to be successful and professional awareness towards sustainability and design grows, the course could be considred to integrate the fix study plan program of Industrial design career. An important aspect to include in releasing this Package is follow-up the support of Ministry of science. this support, which should be included the training budget that came from government, may be in form of supervision, coaching, mentoring.

Implementation of translated prepared Courses (Slideshows), Tools and Case Studies on LeNS Iran Platform

You can access the course page using the purple button.

The red sign w
Materals and T

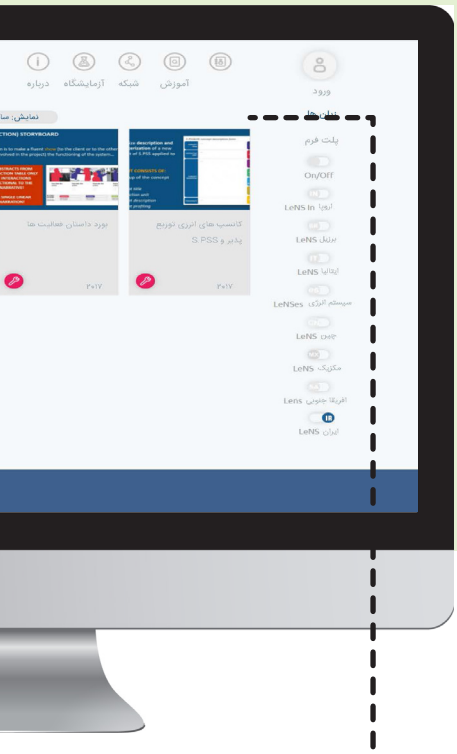
Here are all the other LeNS partners, by switching on the p
key you can observ all materials related to that region.

These Keys give access to some prepared Courses, Tools, Lectures,projects and Case Studies.

You
tion
for S

The yellow button is intended to display the Case Studies list.

ill direct you to the
Tools.



prefered

Short discribtion of each material to have a preview of what you are going to learn.

are able reach to thousonds of tuturial through LeNS internaal Platform and Improve the level of your Knowledge on Design Sustainability.

Conclusion

My research phase is an important part of this project and lasted more than four months starting from status of Sustainable Development in Iran to investigate the situation of Design and Sustainability in Higher Education System and Industrial Design Schools. By own observation and experiences on current exciting courses and series of interviews with some experts in this field. I foresee a path that will help future of Sustainability Design education.

The aim of this thesis is to outlines a Strategic path for Iranian design community, actually, the newest generation of Iranian designers to promote their design ability in regard to design for sustainability (DfS). in fact, in this thesis i presented process that adapted to higher design educational system and used as a good resource for all designers.

During my design process I had discussion session to clarify the inspiration and beneficial points by focusing on challenges and pain points. Several ideas produced during this session through brainstorming and then wrapped up the session with the final offering ideas. Then with the help and support from my two tutors Carlo Vezzoli, Professor of Politecnico di Milano and Mehdi Fallah professor at Art University of Tehran start to develop the ideas and start the design process.

The outcome of this thesis is an immediate implementation LeNS platform as immediate insertion of Design for Sustainability content in existing courses both in undergraduate and postgraduate level of Iran's Industrial Design Schools, and creation of more formal classes on the subject.

We believe this project will provide the good resource for sharing materials and tools (a knowledge-base and know-how) from multiple cultural context in open source and copy left ethos, which will finally enable Iranian Designers to make an effective contribution in the development on innovative and sustainable solutions based on local needs.

Appendix

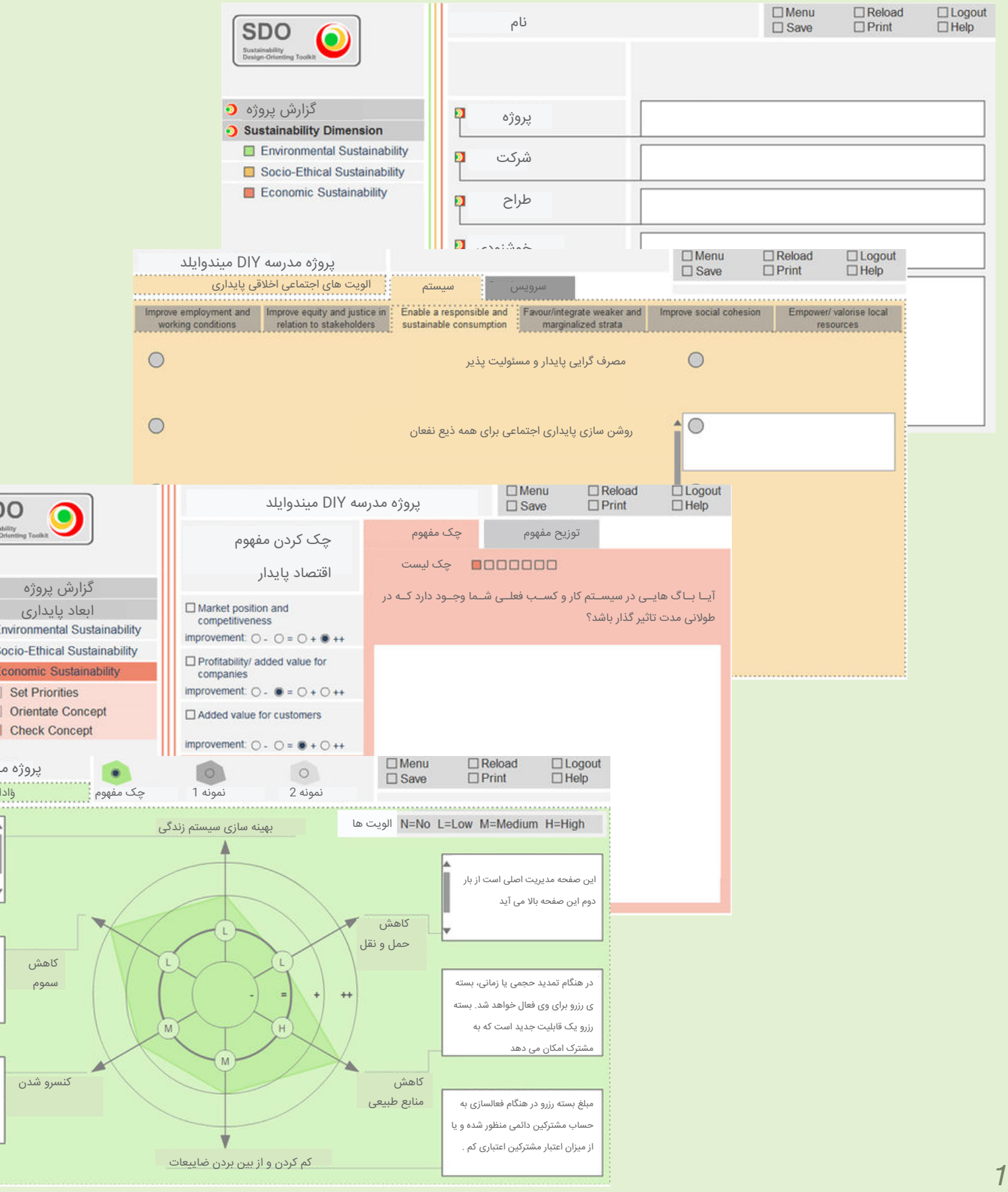
Sustainability Design-Orienting toolkit (SDO) software for application in Iran

The sustainability Design-Orienting toolkit is the main applied tool of the current LeNS web platform, we plan to adopt some of this software to Farsi/Persian language and Iran context of use.
the objective of this tool is to orientate the design process towards sustainable PSS solutions, setting suitability priorities (using checklists), using sustainable design orienting guidelines (using Idea Tables) and checking and visualizing (through proper radar diagrams) the improvements in relation to an existing reference system and its sustainability priorities.

This software helps to identify the solutions that have the highest potential with regards to sustainability. All along the phases of the methodology, the PSS ideas generated and their associated scenarios will be oriented using guideline. Guidelines are an effective support tool used to orient a decision-making process towards sustainable solutions. The SDO toolkit is easy to use and free, being based on the open-source and copy left logic. In this order, the changes should contains the Environmental, Socio-ethical and Economic sub-sections-there and a priority checklist which fits the main Iran Environmental and social concers, which may differ from the current ones created. Although the existing Criterions are general enough to be interpreted from local perspective, a careful analysis ofeach should be taken into consideration for translating the toolkit.

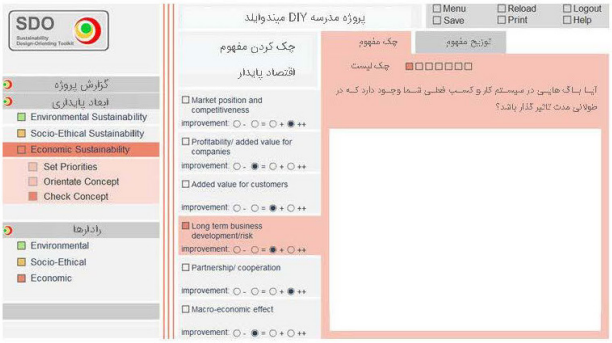
One the other hand, the Guidlines section presents a set og questions that encourage discussion and depth analysis towards a certain Criterion (for example, “Enable costumer to socially responsible consumption”). We relaize that there could also be a slight intervation on these guidlines, in order to target these questiones towards Iran priorities.

For a convenience and better understanding of Iranian designers and other people who are enthusiasts of using this software, we create a summary of how this software works and the functionalities besides the short description of main goals and values in PDF format and implemented on LeNS Iran platform for the download. (Appendix)


SDO
Sustainability Design-Orienting Toolkit
نام
Menu
Reload
Logout
Save
Print
Help
گزارش پروژه
Sustainability Dimension
Environmental Sustainability
Socio-Ethical Sustainability
Economic Sustainability
پروژه
شرکت
طراح
پروژه مدرسه DIY میندوایلد
الویت های اجتماعی اخلاقی پایداری
سیستم
سرویس
Improve employment and working conditions
Improve equity and justice in relation to stakeholders
Enable a responsible and sustainable consumption
Favour/integrate weaker and marginalized strata
Improve social cohesion
Empower/ valorise local resources
مصرف گرایی پایدار و مسئولیت پذیر
روشن سازی پایداری اجتماعی برای همه ذیع نفعان
چک کردن مفهوم
اقتصاد پایدار
چک مفهوم
توزیع مفهوم
چک لیست
آیا باگ هایی در سیستم کار و کسب فعلی شما وجود دارد که در طولانی مدت تاثیر گذار باشد؟
ابعاد پایداری
Set Priorities
Orientate Concept
Check Concept
Market position and competitiveness
Profitability/ added value for companies
Added value for customers
improvement:
چک مفهوم
نمونه 1
نمونه 2
بهینه سازی سیستم زندگی
الویت ها
N=No L=Low M=Medium H=High
این صفحه مدیریت اصلی است از بار دوم این صفحه بالا می آید
کاهش حمل و نقل
کاهش سموم
کنسرو شدن
کاهش منابع طبیعی
کم کردن و از بین بردن ضایعات
در هنگام تمدید حجمی یا زمانی، بسته ی رزرو برای وی فعال خواهد شد. بسته رزرو یک قابلیت جدید است که به مشترک امکان می دهد
مبلغ بسته رزرو در هنگام فعالسازی به حساب مشترکین دائمی منظور شده و یا از میزان اعتبار مشترکین اعتباری کم .

مرحله ۵: بررسی مفهوم (سطح ۱)

بررسی و بهبود پایداری مفهوم سیستم توسعه یافته را تصحیح و تجسم کنید.



مرحله ۶: مفهوم رویکرد (سطح دوم)

ایده های خدمات پایدار را ایجاد کنید.

مرحله ۷: بررسی مفهوم (سطح دوم)

بررسی و بهبود وضعیت پایداری سیستم توسعه یافته را مشاهده کنید.

ارزیابی

با کمک این طراحان محصول و خدمات این ابزار می توانید بینش عمیق در سطح بهبود پایداری مفاهیم جدید خود را دریافت کنید. چند پیشنهاد بهبود و طیف گسترده ای از موضوعات مرتبط ارائه شده است. از آنجا که این ابزار مبتنی بر وب است، می تواند توسط طراحان متعدد از مکان های مختلف استفاده و ذخیره شود. یک ناکارآمدی این است که عدم توانایی صرفه جویی در کل پروژه را به کامپیوتر خود شما. یکی دیگر از سخنان جنبه های حفظ حریم خصوصی مفاهیم شما: پروژه های آنلاین در یک پایگاه داده ذخیره می شود، که احتمالا توسط افراد ناشناخته قابل دسترسی خواهد بود.

اعتبارات این ابزار

ویرایش توسط: کارلو وازولی (Politecnico di Milano-DIS-INDACO)

Sw توسعه: Guiseppe Patriotta و آنتونیو Antonacci (Multimedia360)

سو گرافیک: سالواتوره مزداکانو و فرانچسکو فلیزیانی (Politecnico di Milano-RAPI.labo)

بعد اقتصادی: Ursula Tischner (Econcept)

بعد محیطی: کارلو وازولی

ابعاد اجتماعی و اخلاقی: کارلو وازولی (بر اساس کار اوسولا تایسنر)

SDO (جعبه ابزار پاکسازی طراحی)

معرفی

هدف اصلی ابزار طراحی پایدار، این است که سیستم شما (مفهوم یا طراحی) را با سیستم یا وضعیت موجود مقایسه کنید. پس از استفاده از این ابزار مشخص خواهد شد که جنبه های پایداری طراحی شما ممکن است نیاز بیشتری به توجه داشته باشند.

ابزار توسعه پایدار طراحی

هدف از این ابزار این است که روند طراحی را به سمت راه حل های نوآورانه محصول سیستم خدماتی هدایت کنید. هر بخشی از ابزار مدولار می تواند به طور جداگانه استفاده شود، اما می توان آن را در تمام قسمت های آن نیز استفاده کرد.

برای شروع، اولویت های پایداری (با ا ستفاده از چک لی ست) باید تنظیم شود. پس از ا ستفاده از دستورالعمل های پایدار طراحی (با استفاده از جداول ایده با دستورالعمل ها)، بهبود در ارتباط با یک سیستم مرجع موجود و اولویت های پایدار آن باید مورد برر سی و تجسم قرار گیرد (از طریق چک لیست مناسب و نمودار های رادار).

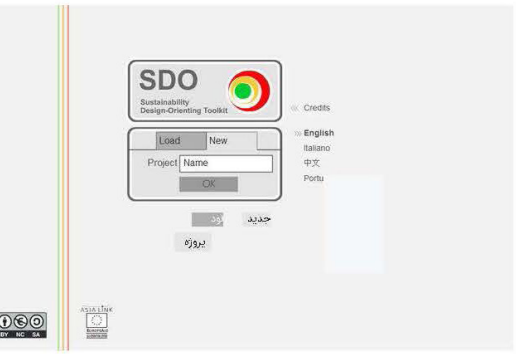
ابزار طراحی را می توان در اینجا پیدا کرد:

Sustainability Design-Orienting Tool

مثال

یک پروژه نمونه به صورت گام به گام برای نشان دادن استفاده از ابزار SDO توصیف خواهد شد.

مرحله ۱: یک پروژه جدید ایجاد کنید یا یک موجود را بارگذاری کنید



مرحله ۲: وارد کردن توضیحات پروژه

سیستم مرجع موجود و مطالعه موردی را توصیف کنید.

مرحله ۳: اولویت های پایداری را تنظیم کنید

اولویت بندی معیارها / دستورالعمل های پایداری و بهترین عمل را تج

مرحله ۴: مفهوم (سطح ۱)

ایجاد سیستم متمرکز بر پایداری (تعامل ذینفعان) ایده ها.

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