Abstract: This paper studies the socioeconomic environmental factors resulting from Industry 4.0 technology (the visible face of which is AI, smart manufacturing/robotics and synthetic biology among many) which would have impact on nature of human life and jobs, relationships and societal relationships. The rapid changes in multiple global socioeconomic fields are such that our collective knowledge about them or what challenges would unfold is limited. However, as its impacts are unprecedented, our collective ignorance or apathy would be an insufficient response. While earlier responses to global crisis like pollution, global warming and inequitable distribution of wealth created in the aftermath of 2nd/3rd industrial revolutions were mostly adaptive and to some extent building up resilience among communities, they proved to be ineffective. This paper studies the possibility of a transformative approach at a macro level, developing opportunities based on 'human activities' and human capital development juxtaposed to capital intensive outputs of Industry 4.0 engaging less manpower and discusses probable role for yoga as a cultural services activity as a person's response to Industry 4.0 environment. Yoga could be a coping tool as a human development activity with its beneficiary effects of preventive health, enhancement of cognitive functioning, skill-set for new economy, to create a self-sustaining lifestyle to empower a person. This could also help in new kinds of jobs, adapt to self-sustenance strategy or have a different idea of 'personhood' to respond to technology. Methodology for this study is based on extant literature study on technology and yoga.

Keywords: Industry 4.0, Adaptive response, Resilience building, Transformative Response, Yoga, Cultural services product

Introduction and Statement of the Problem: There are concerns that smart machines would replace workers, accountants, delivery drivers while ordinary person would work out solutions himself/herself even further reducing number of employed. Israeli historian Yuval Noah (2014) cautioned “against humanity’s collective rush towards self-destruction without the necessary counter measures in place.” Harari (2016) added that “…now we are putting in danger the survival of our species as well as much of life on earth,” with speculation about human being as an algorithm with a chip implant. He emphasized at WEF 2018 that in addition to quality of life as measured in terms of consumption of products and services created and delivered in this new environment that there is a need to look at nature and form of human life. He even foresees some extinction of human life as natural process because of speedier evolutionary process unleashed by Industry 4.0. The Industry 4.0 environment of VUCA (volatility, uncertainty, complexity and ambiguity) with rapid changes in multiple global socioeconomic fields with not enough knowledge about unfolding challenges which this study identifies and studies the role yoga can play as a coping measure as part of adaptive steps to build resilience among stakeholders in Industry 4.0 environment. There is also a probable role for yoga as a transformative measure with its nature as a cultural and mindfulness activity, human development activity and an economic activity to meet the needs of empowerment, leisure outlet and jobs in human activities when technology reduces jobs for human resource. The discussion based on literature study would cover 1) adequacy of response from various stakeholders like profit sector, governments and institutions to emerging environment made up of VUCA; 2) coping with stress and anxiety arising out of job loss and inequality at individual level; 3) cognitive development to work with new technologies and skill sets, thus making human resource ready for new jobs; 4) identity of self when AI and smart machines reduces an individual's role in day to day life and 5) new jobs based on human activities per se and not necessarily with having to with consumption of goods and services of automated productive and distributive systems. Hypothetically, yoga could be one activity as a coping measure which could attend to some of these points. Research methodology for this proposition is literature study highlighting nature of Industry 4.0, its promises and pitfalls, contemporary responses to...
challenges and scope for further research.

Literature Study:-

A: Industry 4.0: Klaus Schwab (2015) first wrote about Fourth Industrial Revolution and, presented it as a promise of poten
tialities and perils of unknown scientific innovations with immense future impact because of its velocity, scope, and systems. This view was shared by pioneers, business leaders and politicians at Davos 2016 (as reported by Larry Elliot, editor, Economics on 24 Jan 2016 and last modified on Wed 24 Jan 2018). It comes as a fusion of technologies in the physical (robotics, nanotechnology, new materials, energy storage, additive manufacturing/3D printing and fully autonomous vehicles), digital (artificial intelligence, quantum computing, Internet of Things, the Industrial Internet of Things (IIoT), decentralized consensus, fifth-generation wireless technologies (5G), blockchain platforms or shared economy and biological (Genome, Synthetic Biology, Bio-printing) fields becoming into one. ACES (autonomous, connected cars, electrification and shared mobility) is also reshaping the market. Such technology infused innovations would be the norm in Industry 4.0 environment extending to other services like living quarters with care management and hospitality services. Job mobility, family units and social connectivity will get altogether new meanings. AI will take over humans at literally every task: translating languages by 2024; assembling lego by 2015; writing high-school essays by 2026; driving a truck by 2027; running a 5k race by 2029; working in retail by 2031; writing a fiction bestseller by 2049; working as a surgeon by 2053 as per some estimates. As UBS Group AG put it at Davos 2016, there is a “polarisation of the labour force as low-skill jobs and even, increasingly, middle class jobs continue to be automated” with further concentration of income streams, wealth and opportunities in fewer hands bestowing upon them unprecedented power to decide about human faith, which could not be truly visualized at present. This is where the complacency of response could set in if past precedents are followed. Thus Industry 4.0, since 2016 has created a debate on all aspects of human life - Economy, Business, Governments, Society and Individuals. It would definitely create wealth as a result of factor efficiency but human factor would suffer as jobs are lost in two ways: one is technological displacement of human factor would create huge job loss; and second is by nature of technological proficiency required of human resource which along with capital intensity of necessary infrastructure, the reward of the gain would follow to intellectual and financial capital which tends to concentrate in few as market leaders, resulting in large scale inequality of opportunities, income. A report by Bank of America Merrill Lynch in 2016 also pointed to the potential for a rise in inequality as a result of increased automation.

B: Meeting Challenges of Industry 4.0: While adaptive capacity, according to Intergovernmental Panel on Climate Change, refers to the “potential, capability, or ability of a system to adapt to climate change stimuli or their effects or impacts” in context of climatic environment, the concept could be extended to meeting global challenges foreseen for Industry 4.0 to handle changes and effects as discussed above. Universal Basic Income: Adaptive solutions could be measures like providing minimum support to needy with UBI (Universal Basic Income) plans “to mobilize private wealth for public good” as per Media Releases Americas [(Zurich 16 Jan 2017] for which huge private capital is needed. However, they are not unqualified positives as historically capital sector had not met its obligations as resource gap is perceived to be huge as an estimate by Deutsche Bank in 2015 indicated USD 5-7trn a year was needed to meet the Sustainable Development Goals as per the Brookings Institute. UBI also creates chasm between two classes - its beneficiaries and supposedly those who contribute to its funding and further making later class into fortifying its entrenchment at the cost of advancement of the former – situation arising from later treating former as an operand resource of consuming class with Industry 4.0 technologies becoming a powerful operant resource. However whether it would build up resilience is doubtful as the dependence it builds up on dole economy.

New Skill Set for New Jobs: Another adaptive measure that is debated about meet challenges is creating skill set so that people coming to job market are able to meet the requirements of new kind of jobs. While new skill set would be required as manufacturing gets creative with the innovation at the heart of the production game, there will be a need to create new business models that would allow mass customization at the cost of mass production and new usages for the experience economy. In this
transformed production process, putting humans at the
heart of the value creation and sharing requires
inventing new ways to collaborate and empowering
these new “augmented humans” to unleash their
creativity – while simultaneously relieving them from
repetitive and arduous tasks as suggested by Dassault
However, this is not total solution as Green, D. (2015)
put it, in most countries, rising inequality has
accompanied economic growth, adding fuel to
existing political and social conflicts.

**Gig Economy and Modularization of Life:** Other
adaptiv solutions could be gig economy or flexible
working hours, modularization of jobs, removing
control, ownership and casualization of productive
contribution. Results could be loss of permanency,
belongingness and being rootless for many
employees. This approach may extend to many
consumptive aspects of human life including
relationships, abode and care taking and giving.
However, the widespread casualization have their own
limitations and negatives considering how human
being became a part of civilization when it became' settled' with invention of agriculture.

**C. Limitations of Adaptive Approach and Need for**
**Transformative Response:** Adaptive response is not
enough if one were to take into account what Green, D. (2015) suggested about the new jobs leading to
inequality. Secondly, as per Dassault Systems ebook 'collaborating and empowering 'augmented humans'
would essentially be created with efficiency driven
capital intensive automated systems leading large
masses to consume and live in a pre-determined way.
Thirdly, “short-term projects and linear, mechanistic
management approaches are often unsuitable for
achieving resilient development in the face of volatile
complexity. Such approaches do not allow the time or
space to adequately analyse complex problems or the
appropriateness of an intervention, nor to adjust the
latter to fit the former” (World Bank, 2014, 2015).
When Jodi Sugden (2016) explained need for adaptive
response to develop resilient communities in response
to environmental risks and suggested resilience
building on top of adaptive capacity, as there are limits
“to which a complex adaptive system is capable of
self-organization ... and ... can build capacity for
learning and adaptation” as quoted by Adger WN,
Hughes TP, Folke C, Carpenter SR, Rockström J
(2005). Transformative approach looks at possibility
of changing the direction of system. Industry 4.0 has
its roots in humanity's collective drive towards 'betterment' expressed as initiatives for removing
some of the pain points like diseases and lacking in
face of environment. However motivations for
commercial exploitation lead to one-upmanship,
competition and exploitative approach to mass
application of innovative newer technologies. At
Davos, the Archbishop of Canterbury said the changes
likely to be brought about required not just an
economic but also a spiritual response to Industry 4.0.
As Davies (1993) and Manyena (2006) put it,
“resilience, a concept concerned fundamentally with
how a system, community or individual can deal with
turbulance, surprise and change, is framing current
thinking about sustainable futures in an environment
of growing risk and uncertainty. Norris, F.H., Stevens,
S.P., Pfefferbaum, B., Wyche K.F., Obrist, B., Pfeiffer,
C., and Henley, R., (2010) focussed on resilience more
as a process than an outcome, involving learning,
adaptation, anticipation and improvement in basic
structures, actors and functions.

**D: Yoga as an activity:-**

**Role of Yoga as a cultural service product in the**
**environment of Industry 4.0:** While discussing role
of yoga as a cultural service product in creating an
opportunity for employment as a service provisioning
economic activity as well as an enabler for to 'do' and
to 'be' activity and self-flourishing activity of
'Aristotelian Concept' of human life to meet the
challenges expected to arise out of Industry 4.0 also
forms an important foreground for the relevance of the
very same role. The challenge of loss of jobs
envisioned under Industry 4.0 arising out of primacy of
technology and capital and imbalances therefrom
could be addressed with yoga as a cultural service as
one of the response in a transformative strategy. The
correlation of the enjoyment of thinking with
meditation is consistent with the idea that cultural
practices and norms influence the amount of
experience people have spending time alone with their
thoughts, and that those with greater experience enjoy
thinking more. (e.g., H. Smith, 1991; Tsai et al., 2006;
Tsai, Knutson, et al., 2007; Tsai, Miao, et al., 2007;
Yoshioka et al., 2002). It is essential to emphasize a
human being in role of an operant resource with a free
choice, not made subservient to AI implant or human
augmentation to facilitate technology to create a
productive system or product and service to cater to
'want' for which there may not be a real need or a free choice. That would otherwise be for the purpose of converting such augmented “human being into operand resource of market segment to be exploited or penetrated.” McKnight, J., & Block, P. (2010) suggested to consumers to be creators of value than to be dependent on creations of market and for which to restore vital functions like care and nurture in families and reconstructing the competence of communities. This could be a way of looking at human resource as an operant resource. With yoga practice, empowerment of a person leads to development of ‘operand' aspect of human personality with its impact on cognitive development, physical and mental health and cultural enrichment. Yoga is defined as a unity of body, mind and consciousness as enunciated in Patanjai Yoga Sutra with a codified Astang Yoga around 4th Century AD [Desikaran (1987)] and with greater emphasis on physical and mental health as in Hatha Yoga Pradeepika in 14th/15th Century [Nath Yogi Swatmarama (1914)]. Empowered as such, a human system could balance artificial augmentation of human capabilities with new science and technology based applications to absorption and processing capacities of stimuli, its speed and variety. Diamond, A., & Lee, K. (2011) studying interventions to aid executive function (expressed as creativity, flexibility, self-control, discipline and staying focussed) development in children 4 to 12 years old showed improvement among children practicing aerobics, martial arts, yoga, mindfulness among other activities. About 370 schools in UK have decided to introduce learning of relaxation techniques, breathing exercises and other methods till 2021 in a study to “help to regulate their emotions” and make students aware of “issues of increase in level of anxiety among children aged between 5 to 15 years having reached 11.2% in 2017 from 9.2% in 1999 as per National Health Services Survey in UK with Action for Children, a British charity, UK calling it a response to concerns of increasingly complex modern world and defended “services like these can lessen the anxiety, pain and anguish that some teens go through, but also reduce their need for intensive support further down the line.”Trent, Natalie L.; Miraglia, Mindy; Dusek, Jeffery A.; Pasalis, Edi; Khalsa, Sat Bir S. (2018) in a study on frontline professionals from education, health care, human services, and corrections who participated in the yoga based program instilling Resilience, Integration, Self-awareness and Engagement (RISE) and reported that RISE improved indices of psychological health and healthy behaviours that remained 2 months following RISE. Folleto, J. C., Pereira, K. R., & Valentini, N. C. (2016) and Broderick PC, Metz S. (2011) suggested that yoga practice could contribute in increasing social acceptance, communication, and contributions in classes. Powell L, Gilchrist M, Stapley J. (2008) showed yoga and relaxation for children with emotional and behavioural difficulties attending primary schools indicating improvements in self-confidence, social confidence, communication and contribution in the class.

Research Methodology:-

Research Objectives: Considering the challenges posed by self-propelling march of technological advances where it seems that human beings are unable to keep the pace with the same, the inadequacies of adaptive and resilience measures among social and economic systems need to be supplemented with transformative tools where human being is in centre of solution rather than a mere human resource.
1.Evaluating existing mechanisms to confront the impacts of Industry 4.0. E.g. Adaptive measures for their efficacy.
2.#Stakeholders (Capital and Labour; Producers and consumers; Profit sector and Governments/Institutions/Regulatory bodies/Institutions/Advocacy groups; Empowered and non-empowered or high skilled and low-skilled) to the problems and solutions.
3.Yoga as one coping measure or as transformative response.

Research Questions
1.To study and evaluate the impact of Industry 4.0.
2.The response of stakeholders to the impact.
3.Motivational Drivers for corrective action by stakeholders
4.Comparative study of likely measures

Research Hypotheses
Ho1: Impact of technology on available human resource is not positive.
Ha1: Impact of technology on available human resource is positive.
Ho2: Challenges of technology could not be met with human empowerment.
Ha2: Challenges of technology could be met with human empowerment.
Ho3: Technology and human resource need not to move in tandem.
Ha3: Technology and human resource need to move in tandem.

Methodology: Different methodologies are required for three stages of research for this study. As a concept paper, I carry out the first for this paper.
1. Exploratory to identify present philosophy and practice
2. Explanatory and qualitative to study alternatives from representatives of stakeholders.
3. Descriptive to study alternatives.

Research Findings And Hypotheses Analysis
As the evolving technological changes are taken as predictive in this study (and un-predictable in nature), hypotheses analysis is concluded as follows.

❖ As per H1, the positive role of technology is not excluded from probability scenario.
In self-sustained or subsistence economies of hunting days and progression to farming communities along rivers and yet later on from industrial revolution of 18th and 19th centuries to IT and internet of last 4 to 5 decades, it is observed that mankind left with more and more leisure time on hand had found ways to spend that as a resource as they are finding ways to create 'leisure time' from hours spent on earning and living simultaneously. This indicates human proneness and propensity to find activities for the sake of activities to fill in the gap of time in their daily human life. Thus, with the march of technology, new activities have been found which did not exist earlier and which led to development of culture which enriched their lives and more importantly, made good life available for greater number of people. Increasing availability of education and health had added to movement in that direction.

❖ As per H2, the probability of human empowerment is not precluded from being technology-neutral. Cultural activities include leisure time activities e.g. experiential domains in real life and VR (Virtual Reality) domain including in travel, tourism, food culture, performing arts and culture, life experience as an alternative existence exploration, with new locations, life styles, friends, associates, partners and participants with servitization of living space and work stations as major economic activities. These activities have a substantial scope for co-production and consumption paradigm of job creation and living life meaningfully wherein technology could play a significant role.

❖ As per H3, technology and human resource might or might not move in tandem.
But yoga as one of the facilitator of cultural activities and resultant social capital would be useful coping strategy. In anthropological terms, art and culture have taken roots in times of economic stability and grown further in times of economic prosperity. This results from human propensity to use its mind and limbs for activities motivated by factors beyond survival. Being a social animal, human being is inclined to also direct these activities to group formation and approval within the group. The ability for cooperation among people with sense of belonging is an important source of well-being. It gives enjoyment and direction, a sense of purpose and meaning. Yoga practice undertaken in group reinforces this. The need for basic empowerment is primary which depends on the expansion of people's capabilities - expansion that involves an enlargement of choices and thus an increase in freedom. As per extant literature, yoga could play useful role a coping strategy for an individual and as an economic activity as a macro level approach.

Conclusion and Limitations:-
Transformative Response for survival: Ability to change and invent new: As per extant literature 1) yoga is a cultural activity which could be adapted as co-production and co-consumption economic activity model to counter the threat posed by Industry 4.0 wherein “billions of people may be pushed out of the job market. And we will see the creation of an enormous new class — the useless class” in the words of historian Harari (quoted from a speech at WEF 2018). 2) Yoga helps in cognitive development to meet the preparedness for probable Industry 4.0 job opportunities, and 3) broadens and deepens the sensitivity of a person thus refuges perceptual reality of a personhood in an AI driven environment.

Whether yoga as one of the cultural service products as economic activities could help an individual's response as to changes in eco-sphere as resilience capability or transformative capability in
INDUSTRY 4.0 environment needs to be examined with further availability of data for an indicative conclusion. 

**Scope for Future Research:** As a concept paper, the applicability of conclusions drawn are limited to the extent of being indicative of future direction of research that I would like to pursue.

**References:**

- Digitization and Continuity. e-book published by Dassault Systèmes https://discover.3ds.com/digitalization-and-continuity