DESIGN AS GENERATOR (DAG): AN ARCHITECTURAL APPROACH FOR EMPOWERING COMMUNITY

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ABSTRACT

Design as we imagine should act like a generator, to become light for others. This is the concept of Design as Generator (DAG). It main goal is for bring the essence of Architecture in which to enhance the quality of life not just for self but for others. For this purpose we create D-Apps (Dwelling Applications), D-PaD and A-PaD (Dwelling and Area Prototype Applicative Design) that will explained by our experimental dwelling project 200 Rumah Besi and our future project taki (taman kita) Community Sustainable Park. We also developed DAG particular empowering and participatory design methodology – inspired by PAR (Participatory Action Research) and DT (Design Thinking) through mixed methods research, the Sequential Embedded Experimental Model.

Keywords: Design as Generator (DAG); 200 Rumah Besi; taki (taman kita) Community Sustainable Park.

INTRODUCTION

It is simple facts: Earth is in deteriorating condition, our natural and built environment is collapsing and obviously architecture is not doing enough to help, probably even worsening it. Thus what we have to do is to change fast. Therefore in Architecture, it needs to be back to its essence: to enhance the quality of life achieved through understanding architecture within its comprehensive and complete cycle of its activities: design, build and dwell (Katoppo and Oppusunggu, 2011, 2012). Hence we should explore the possibilities of: (1) positioning design as champion in its role for changing the community; (2) making basic changes through design and architecture within the context of dwelling, and; (3) placing participatory activities in design and architecture upfront to ensure its sustainability.

DESIGN AS GENERATOR

The Concept

Design as we imagine should act like a generator, building up and transform the energy to become light for others. This is the concept of Design as Generator (DAG). Imagine design as living organism, a virulent virus forcing people to change their lives and inspire others. In the world of DAG, design should be practical and applicable as it served its own goal to enhance the quality of human life, yet it never meant for building its exclusiveness but rather it meant for others: design serves, design generate. Thus, we, designers are the initiator, inventor and the operator of this (life) generator (Katoppo and Oppusunggu, 2012, 2013a).

DAG believes that: (1) (Sustainable) Design can give rapid changes and accurate within the context of design participation and community empowerment; (2) Design should be and can change everyday life. It should influence everyone and the only way that is necessary to endorse innovation in human life; (3) Sustainable design approach can only be sustained with active participation of its user, thus; (4) DAG will be acting as a hard proof of design virulent effects in the area of build environment, which will causing change trend movement into better life for its user, from the scale of personal to communities (Katoppo and Oppusunggu, 2012, 2013a).

DAG is a series of design experiments to enhance dwelling activities with an active involvement and contribution from its user. These will achieve through the creation of D-Apps, D-PaD...
and A-PaD, in which the acronyms derived from the genius idea of Apple's I-Pad by the late Steve Jobs. D-PaD, stands for Dwelling-Prototype Applicative Design, is a dwelling deliberately designed to innovate sustainable or life changing event approach of its dwellers. Innovations emerged from personal creativity of its user will be known as D-Apps, stands for Dwelling-Applications. D-PaD and D-Apps will generate others, thus design in the context of dwelling and built environment will be a generator. If the generator already on and it generate other D-PaD and D-Apps, thus it should generate and form A-PaD, stands for Area-Prototype Applicative Design. (Katoppo and Oppusunggu, 2012, 2013a)

RESEARCH METHOD

We propose PAR (Participatory Action Research) as research umbrella for implementing DAG architectural research. This is because we perceive DAG as the combination of thinking and implementation – ideas and actions altogether. PAR gave research complete motions, moving cyclically between act of conducting research and action throughout the whole process. Rooted deeply within Critical Social Science (CSS) (Neuman, 2006), PAR was gaining popularity especially in the area of community empowerment and community development. It is where full participation using bottom up approach from the community member and all stakeholders including the researcher regarded nowadays as the best approach and method for the more sustainable development (Taggart, 1994, 2006; Ife and Tesoriero, 2006, 2008; CDE and Changed, 2008; Jenkins and Forsyth, 2010; Kaszynska et al., 2012; Klocker, 2012; Banks et al., 2013). Creswell and Clark (2007) proposed four types of worldview in current research: Post Positivism, Constructivism, Advocacy and Participatory, as well as Pragmatism. In this respect, PAR falls into the category of CSS approach of social science methodology and Advocacy and Participatory research worldview. The abduction methods adopted (Neuman, 2006) in PAR is in line with architecture sense of creation, innovation and prediction of the future uncertainties. It is flexible in its approach and connections with other disciplines and possibilities that could be emerging from them. PAR’s goal, in which to generate sharing production of knowledge that eventually emancipating and empowering everyone, is also compatible with architecture social dimensions. It means architecture activities should not just encourage physical productions. Moreover, it should encourage profound productions of knowledge that emancipate and empower human along with their social context dynamic connections. PAR reflexive nature is also parallel with architecture modes of works, where reflection is highly regarded. PAR other characteristics, such as: heterogeneous, theoretically informed practice, and believed in the good nature of every human beings (Taggart, 1994, 2006), were also share similar conceptual frameworks where architecture stands, especially the last part in which often a forgotten quality of our highly regarded architectural practice.

On the other hand, we saw DT (Design Thinking) with its HCD (Human Centered Design) toolkit for social innovation project fits well with PAR-Architectural research model, as it promotes innovations, the key themes of architectural work that connected directly with social concerns.

According to Brown (2008, 2009), a design thinker should have empathy, integrative ways of thinking, optimism as value, experimentalism in heart and love collaboration. Brown then made 3 (three) spaces that ensure innovation process worked: Inspiration, Ideation and Implementation space. He also gave three considerations for a design thinker: desirability, viability and feasibility. Within social projects, Brown and Wyatt (2010) argued more about the connectivity between Design Thinking and social situation, especially DT potentials of channelling fast and accurate innovation. IDEO team, IDE, Heifer International and ICRW (2013), funded by Bill & Melinda Gates Foundation developed Human Centered Design (HCD) toolkit, a Design Thinking toolkit for social innovation project. The toolkit aimed as design innovation guidelines for communities living with income below USD 2. HCD toolkit has similar consideration as DT, in which the design innovation produced must be needed, feasible and appropriate within its social context.

HCD worked in three stages, which are: (1) H(ear) – listening to what is needed and where the design teams blend with the community, collecting stories and inspirations from the locals; (2) C(reate) – in which the design teams work collaboratively with the community in form of workshops, design charrettes, translating stories and inspirations gathered from the first phase into frameworks, opportunities, problem solving and solutions, and the making of prototypes; (3) D(eliver) – where all stakeholders gather and design the sustainable implementation plan.

Finally, we proposed mixed methods research, based on Sequential Embedded Experimental Model from Creswell and Clark (2007) for combining PAR research dimension and DT research toolkits. The
combinations will collaboratively allowed architecture moved along its quantitative sides as experimental innovations works through prototyping, effects measurements and evaluation process of architecture designing. Similarly, it will engaged architecture with its qualitative sides, as experience appreciations within participatory activities among every stakeholders during the whole process of an architectural creation through conducting Field Action Research.

This is what we perceived as DAG particular empowering and participatory design methodology. It will give new values to architecture in virtue of its design innovation and its response to social context. Ultimately people will share knowledge production activities that emancipate and empower them through their own architectural engagement and experiences (Katoppo & Sudradjat, 2014) (Table 1).

**THE PRACTICE**

**Field Action Research 1: Generating D-Apps and D-PaD - 200 Rumah Besi**

The idea of DAG was emerged from 200 Rumah Besi. It is a dwelling designed intentionally by its owner and architects as an architectural research laboratory. 200 Rumah Besi is located inside suburban kampong of Pondok Pucung, South Tangerang, Banten surrounded by mega modern real estate. The presence of 200 Rumah Besi attracted and influenced its surroundings. Its unique design experimentations eventually communicate itself and immersed within the kampong society. 200 Rumah Besi is the perfect example of how architecture works through its three comprehensive activities, in which through redefining how to design, how to build and how to dwell.

Redefining how to design achieved by creating MODURA (MODul Untuk Rakyat – a base design module for the people). Searching for ideal modules led to a research considering efficiency value in material used, time and budget. It started to combine Greek’s golden section principles, phi number and Le Corbusier’s Modulor (Ching, 1979) to came out with own module principles of MODURA that have 0.6m based measurement and its multiplication. The module then governed 200 Rumah Besi design from its layout to 3-dimensional form (Katoppo and Oppussunggu, 2011, 2013b) (Figure 1).

Redefining how to build achieved by using experimental main structure for 200 Rumah Besi: 6/12 Hollow Steel with 0.3cm thickness. This methods allowed the construction of the whole 200 Rumah Besi structure finished within 4 weeks (4 days to finish the main columns and roof structure, 1.5 weeks to finish the whole structure and 2 weeks to applied the finishing and installed the roof tile).

If compared with conventional concrete structure, the costs efficiency reached approximately 1.5 times less, or 2 times less than wood construction and 3 times less than steel construction. It is also suited environmental and sustainability concerns, as: (1) the production of hollow steel is using lesser energy than steel production; (2) Its availability relatively easy compared to the now scarce and problematic wood materials; (3) It reduced materials and energy usage. It also reduced waste during the construction process. Approximate calculation showed at around 40% reduction; (4) the range of availability of the material is only below 20 km from $+<300$ km considered as sustainable range, and; (5) the transportation methods to brought hollow steel into construction location was very simple and easy. 200 Rumah Besi also used recycled materials (kamper woods for all door and window panels; steel for water tower, etc.). Local material as bamboo used as main façade partition and bamboo mats used as hollow partition above 3,6m level (specially designed to ensure air circulation).

Most parts of the building were finished minimizely: (1) most floor finished only with cement layer. Ceramics only used in the service area; (2) brick walls were finished according to its function – interior finished were exposed bricks, and exterior finished with only cement layer (for holding the heat). Paint used only in 1 wall plane and kitchen; (3) the steel construction finished with anti-corrosion paint and used its standard colour; (4) all woods and bamboos work finished only with wood varnish after going

**Table 1. Proposed DAG Design Methodology**

Source: Katoppo & Sudradjat, 2014
through its drying process. 200 Rumah Besi construction completed with average budget of Rp 1.2 million/m² or 1.7 million/m² (with mezzanine), compared with the average budget of 2.5 to 4 million/m² for building a house according by the then 2010 actual price (Katoppo and Oppusunggu, 2013b) (Fig.1).

Yet, to be completely experience architecture, one should dwell in it at its broadest sense. Architecture is about giving space for activity: making it place. Architecture main purpose is to increase the living quality of its user and its surrounding. Re-define how to dwell obviously means continuing engagement between architecture, the activity derived from it and how it worked within its context. The process generates throughout its life span. This achieved in 200 Rumah Besi with: (1) Responding to Site: 200 Rumah Besi is located in the middle of kampong. Thus, its presence should felt welcome by the locals. In that case, the locals had used 200 Rumah Besi for various public engagements and it was originally the locals dubbed the term Rumah Besi (Figure 2); (2) Thermal Comfort: It is hard to meet the ideal condition of thermal comfort (Temp. 18-24°C, Rh. 50-60%, wind velocity 0.25-0.5 m/s (in) and 1.7-3.3 m/s (out), especially if Jabodetabek had 27-32°C, Rh. 70-90%, and wind velocity of 0.5-1.7 m/s. Thus 200 Rumah Besi designed at least to maintain this condition, not worsening it. The maximum difference between the inside and the outside of the building is 7°C and at minimum is 0.5°C, while on the average 2°C, with average wind velocity inside 0.0-0.25 m/s, while on the outside (esp. from the South) average range of 0.5–2.5 m/s. Average relative humidity is 72.5%; (3) Waste Management: Living at kampong means that we should have dealt with our own garbage. From 100% domestic waste produced by 200 Rumah Besi only 26.24% dumped – or given back to the local government; 39.89% were composed by biopori and 33.87% were recycled – or 73.76% wastes were managed by self/community (Katoppo & Oppusunggu, 2011; Oppusunggu, 2011). (4) Rain Water Harvesting System: Adopting research from Badan Pengkajian dan Penerapan Teknologi (BPPT) Nasional called Zero Delta Q Technology (Tempo, 2011), 200 Rumah Besi developed its own rainwater harvesting system while maintaining the spirit of keeping the 'green' technology simple and accessible for all. It used 1 roof plane, 6’ roof gutter, 1 separator 4’ pipe for the first 100 litre poisonous rain water, 2 filtering 4’pipe, 2 filtered rain water collecting tanks (each 1000 l that would filled within 15-30 minutes of average hard rain), and 1 overflowing 4’ pipe with 4 meter in depth that will send the rain water under ground as an alternative ground water reservations especially used in dry seasons (It has 2 hours saturation time and 3.58 m³ volume of water injected). The system used for cooling 200 Rumah Besi mezzanine space directly below the roof and for its garden and greenery watering purpose. Moreover 200 Rumah Besi have three types of 4’, 1.2 m holed pvc pipe biopori: (1) 9 holes were use as rainwater absorbance in its backyard; (2) 9 holes of combined use for absorbing rainwater and organic domestic wastes dumping with 3 months decomposing methods in its side terrace; (3) 9 holes of combined use for absorbing rainwater and function as alternative sewer system facing the main road (Katoppo and Oppusunggu, 2013 a & b) (Fig.2).
With all its experimentations, 200 Rumah Besi consequently became the 1st Dwelling-Prototype Applicative Design (D-PaD) with series of dwelling activities innovations or Dwelling-Applications (D-Apps). These then should generate others and later should generate and form Area-Prototype Applicative Design (A-PaD).

Field Action Research 2: Generating A-PaD – taki (taman kita) Community Sustainable Park

Within the context of DAG, automatically Kampong Pondok Pucung, South Tangerang, Banten, where 200 Rumah Besi stands, will be the Area-Prototype Applicative Design (A-PaD). The remaining native kampong is surrounds with concrete walls built by the developer of mega modern real estate adjacent to it. The kampong situation is far from well developed. It is a self-growing settlement area through informal and disarray setting. It has no proper roads, sewer system, utilization, sanitation, and garbage disposal system. Thus, resulted on community ignorance or at best tried conventionally managed it (i.e.: burning the garbage, made a traditional embankment – empang for the human waste disposal, etc.).

On the other hand, relationships between the kampong inhabitants still show the traditional and warm connectivity towards each other. They socialize in front of their terrace, on the road with passerby, mingled in front of small kiosks (warung), gathered in mosque and prayer groups (pengajian), in every community celebration: (wedding, circumcision party, election times, watching temporal big screen movie (layar tancep), maintained night watch activities (ngeronda), and many other communal gathering activities. The young ones, the children always play and doing outdoor activities wherever there are open spaces, let it be on the road, empty disarray lot or even in someone’s yards.

A Park should fit the community’s primary needs. It will provide communal space for gathering while maintaining the warm connectivity and in the same time providing place for the children to play properly. Sustainable approach for the Park feels fit answering other needs and problems of Kampong Pondok Pucung. Sustainable Park will instil models of appropriate environment and changing their habits of dealing poorly towards garbage disposal system.

For the children, a park also in a sense has a special purpose. Park means play for children, while children mean the future. Thus by designing and proposing park we will also be investing to new character and awareness to the future generation and by that to the future of their dwelling place. Playing activities, therefore, are invaluable rehearsals for their future lives and park is the best space to be the place for this specific and driven-purpose activity.
In designing the Park, we thought that the best approach would be where the community participated. Community participation in design should be a genuine participation, which is promoting cooperation (refers to partnership and delegation of powers) and citizen control (which means empowerment).

Thus, the main purposes of it should be as follows: (1) To involve people in design decision making process, therefore, it will increase their trust and confidence to the projects; (2) To provide people with a voice in design and decision making in order to improve plans, decision and service delivery; (3) To promote a sense of community by bringing people together who share common goals.

The experiences that should follow any participation should be building awareness, shaping perception, togetherness in decision-making and involvement in the implementation (Sanoff, 2000).

**Taki Community (Sustainable) Park**

The name *taki* is shortened for *taman kita* – means our park. *taki* Park will be a design project for, with or by the community. It will try to respond to Kampong Pondok Pucung’s needs (i.e.: communal gathering space, children playground and garbage disposal system) while in the same time investing on building appropriate environmental awareness and inducing sustainable approach way of life to its community. This park will be DAG prototype and example of how design can be a generator that generate others.

The specific location of *taki* Park will be on an empty disarray remaining lot owned by one of the native families in the kampong. The location is strategic as it is located in the intersection or junction between neighbourhood association (*RT: Rukun Tetangga*) and the main kampong street that leads to the mega modern real estate. In the meantime, this remaining 13x14m² lot is just an empty disarray lot in a wreck condition. The lot used as garbage burning and dumping sites, place to dry the washed clothes, children playing, vehicle parking, and temporal activities (i.e.: celebration tent – wedding, dangdutan (traditional musician performer) stage, temporal big screen movie (*layar tancep*), etc.).

*Taki* is still in the preliminary design stage. The next stage should be on building discussion with the entire stakeholder. Because of the nature and the uncertainty future of the lot, *taki* initial design use movable parts and modular construction system.

*Taki* Community (Sustainable) Park will provide (Katoppo and Valencia, 2013) (Fig.3):

a. Communal gathering space. It will be placed at the best spot facing the main road as the gate and the symbol of the Park. The communal gathering space will be built using simple movable stage and roof construction using bamboo or used wood and steel as the materials. It will be in a form of amphitheater. The floor will use scraped roofs or knitted bamboo woven. This space also ensures any temporary celebration activities usage.

b. Children playground. It will be the heart of this Park. The playground designed with a vast green grass formed mildly leveled and contoured stimulating adventurous sense to the children. It also served as parts. The green grass will be planted on the top of movable and elevated simple used wooden planks or used steel construction.

c. The 5 senses interactive and greenery walls. It will be using the walls from the existing rental rooms building. The designed walls will not just be interactive equipment for children through the 5 senses stimulating materials, but also interactive equipment for adults through its greenery walls on the upper side of the 5 senses interactive walls. The greenery walls also served as place where the adults still can hang their washed clothes in the morning before the Park use by the children to play in the early evening.

d. The water and garbage disposal management system. The water management system will use the existing water tank modified to be able to catch and harvest rainwater. It then will be reuse for the Park maintenance and the water features that the children can play with. The garbage disposal management system will use separate bins for types of garbage, *biopori*, recycling bins, *takakura* bins, small garbage sorting workshops and creative area where adults or children could play with recycled and non-hazardous garbage. Both systems will also act as interactive educational tools for the adults and the children, targeting on building up their awareness on the issues and as a trigger for their creativity especially responding to their own dwellings.

e. Playing equipment, such as sliding, climbing and swings, made from recycled and reused materials: (used rubber tire) will be provided.

f. Stimulating Path. It will use the existing layer of the lot combined with materials that can stimulate the tactile experience, such as: stone pebbles, scraped roof tile, used tiles, etc., with safety consideration for its users especially the children.

g. Accessibility of the Park will be from every corner of the lot, it designed as open space without fence or walls. The Park will also provide: vehicle and bicycle parking.
CONCLUSION

Design As Generator: beyond

The fact is there are still many things that can be generated from 200 Rumah Besi as the 1st D-PaD with its many D-Apps and taki as the 1st A-PaD. 200 Rumah Besi as individual dwelling experiment showed many opportunities and chances that can be generated from personal or self architectural/design activities. It was evident throughout the entire phase of designing, constructing, and up until the phase of dwelling. 200 Rumah Besi will be the example of how one built home could generate many things throughout its dwelling activities and show its potentials to others (Fig.4).

Taki on the other hand will serve as an area generator within the scope of communities architectural/design activities, where the community was pushed to change together by external dwelling activities. Taki showed how design generate and how design becoming useful for others (Fig.4).

We also opted to work smart and contextually: make the best of virtual world progressive development. Fast and viral could only be achieved through the power of virtual social network.

Acknowledging this idea, DAG then developing its own website: www.dagedubrag.org. It will serve all the DAG intentions, written as the website vision and mission: “To become a leading low technology sustainable applicative design research and information sharing website discussion room dedicated especially to middle-low communities empowerment in Indonesia, but in the end have virulent effects for all communities no matter what the background are”.

Figure 3. Taki (Community) Sustainable Park
Thus, DAG goals which are to generate architectural design and research alternative approach for empowering the community, can be conclude as: (a) to generate design as champion/awareness in its role for changing the community (DAG); (b) to generate design as creative personal activities within the context of dwelling - design for self/design within dwelling activities (D-PaD, D-Apps); (c) to generate design as communal, collective and collaborative activities - design for others/design generate (A-PaD), thus placing participatory activities in design and architecture upfront to ensure its sustainability.

ACKNOWLEDGMENTS

The Author would like to acknowledge and be thankful to Iwan Sudradjat, Ph.D, DAG team (www.dagedubrag.org) and especially to the people of Kampong Pondok Pucung, South Tangerang, Banten.

REFERENCES

Banks, S. et al. (2013). Everyday ethics in community-based participatory research. Contemporary Social Science: Journal of the Academy of Social Sciences, 1-15.

Brown, T. (2008). Design Thinking. Harvard Business Review, 1-9.

Brown, T. and Katz, B. (2009). Change By Design: How Design Thinking Transforms Organizations and Inspires Innovations, New York: Harper Collins Publishers.

Brown, T. and Wyatt, J. (2010). Design Thinking for Social Innovation. Stanford Social Innovation Review: Stanford School of Business, 29-35.

Ching, F.D.K. (1979). Architecture: Form Space & Order, New York: Von Nostrand Reinhold.

Community Development Exchange (2008). What is community empowerment? cde & changes guide, funded by National Empowerment Network: UK.

Creswell, J.W. and Clark, V.L.P. (2007). Designing and Conducting Mixed Methods Research, Sage Publication, London – New Delhi.

Ife, J. and Tesoriero, F. (trans ed. 2008 – based on 3rd ed. 2006, Pearson Education Australia). Community Development: Alternatif Pengembangan Masyarakat di Era Globalisasi, Pustaka Pelajar, Yogyakarta.

IDEO team, IDE, Heifer international and ICRW (2013). Human Centered Design (HCD) Toolkit: Design Thinking Toolkit for Social Inno-
Jenkins, P. and Forsyth, L. (2010). Architecture, Participation and Society, New York: Routledge.

Kaszynska, P. et al. (2012). Re-thinking Neighbourhood Planning - From consultation and collaboration. Models and Partnerships for Social Prosperity, United Kingdom: A ResPublica Green Paper in association with RIBA.

KATOPPO, M. and Sudradjat, I. (2014). Combining Participatory Action Research (PAR) and Design Thinking (DT) as an Alternative Research Method in Architecture. Proceeding of Artepolis International Conference, School of Architecture, Planning and Policy Development, ITB, 5, 43-53.

KATOPPO, M. and Valencia, P. (2013). taki Community (Sustainable) Park. Proceeding of International Conference on Creative Industry (ICCI) 2013, Department of Industrial Design, ITS, 57-62.

KATOPPO, M. and Oppusunggu, R. (2011). To Build and To Dwell (part II) – Is there such thing as Sustainable Architecture. Proceeding of International Conference on Creative Industry (ICCI) 2011, Department of Industrial Design, ITS, 163-168.

KATOPPO, M. and Oppusunggu, R. (2012). Design as Generator-Case Study: 200 Rumah Besi. Proceeding of Artepolis International Conference, School of Architecture, Planning and Policy Development, ITB, 4, 131-140.

KATOPPO, M. and Oppusunggu, R. (2013a). What is and Why Design as Generator? Proceeding of International Conference on Creative Industry (ICCI) 2013, Department of Industrial Design, ITS, 51-56.

KATOPPO, M. and Oppusunggu, R. (2013b). 200 Rumah Besi - The 1st DAG* for Sustainable Housing Innovation Alternatives. Proceeding of International Conference on Innovation in Technology & Policy for Affordable Housing, Ministry of Public Works, RIHS & RISH-Kyoto University.

Klockner, N. (2012). Doing Participatory Action Research and Doing a Ph.D: Words of Encouragement for Prospective Students. Journal of Geography in Higher Education, 36(1), 149-163.

Majalah TEMPO (2011). Menabung Air di Musim Hujan. Desember, 60-61.

Neuman, L. W. (2006). Social Research Methods – Qualitative and Quantitative Approaches, 6th ed., Boston: Pearson Education, Inc., SF.

Oppusunggu, R. (2011). My Garbage My Responsibility. Proceeding of International Conference on Environment Talk, Department of Architecture, UMB.

Sanoff, H. (2000). Community Participation Methods in Design and Planning, New York: John Wiley & Sons, Inc.

Taggart, R. (1994, publ. on line 2006). Participatory Action Research: issues in theory and practice. Educational Action Research, 2(3), 313-337.

www.dagedubrag.org/about DAG/vision and mission statement, Retrieved 28 October 2013.